

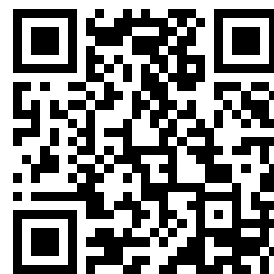
Railway supplies

General Electric Company

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INTRODUCTION

IN presenting this catalogue, the General Electric Company hopes to place in the hands of its customers information which will enable them to readily select repair parts for the maintenance of their equipments and lines, and such other supplies as are best suited to their various requirements in the construction and operation of complete electric railway systems. The various classes of material are arranged to facilitate the selection of repair parts most often required, and every effort has been made to include in each section descriptive matter sufficient for the customer to readily determine the exact material necessary for his particular needs. Catalogue numbers should invariably be used; failure to use them will cause inconvenience and delay, not only in placing, but in filling orders.

It should be borne in mind that these data are published for the convenience of customers, and every effort is made to avoid error, but this Company does not guarantee their correctness, nor does it hold itself responsible for any errors or omissions in this publication. Both prices and data are subject to change without notice.

ADVICE REGARDING THE PLACING OF ORDERS

1. Orders, and correspondence regarding orders, must always be sent to the nearest Sales Office. (See list of Sales Offices at end of this catalogue.)
2. Catalogue numbers should be used wherever possible.
3. Avoid ordering goods "same as last." If it is advisable to refer to a previous order the date and number of the order and the number of our invoice covering previous shipment should be specified to avoid delay and error in locating it.
4. In ordering, catalogue numbers should be accompanied by the name of the article. This insures complete identification, and lessens the danger of typographical errors in transmitting orders. Where it is impossible to give the catalogue number, a full description of the article required should be furnished.
5. State distinctly how goods are to be shipped—whether by freight, express or mail. If any special route is preferred, it should be mentioned on the order.
6. Careful attention is given to the proper packing of goods, especially glassware, and receipts are obtained from carriers for delivery in good condition. This Company cannot, therefore, be held responsible for goods damaged or lost in transportation. All possible precaution, however, will be used to prevent injury or delay, and, if required, shipments will be traced. All claims for breakage should be presented to transportation companies handling the freight. We will gladly co-operate with our customers in having such claims adjusted by the carriers.
7. All claims must be made within three days of the receipt of the goods and should be accompanied by the package slip which is forwarded with each shipment.
8. When referring to orders, always give the number or date of your order as well as the name of the consignee of the goods.
9. Do not return material of any kind without first communicating with the nearest Sales Office and obtaining—
 - First:* Approval for returning goods.
 - Second:* Returned Apparatus tag, giving proper shipping directions.
10. All returned goods must be plainly marked with the name and address of the sender, and proper notice of shipment and shipping receipt should be sent to the Sales Office.
11. Prices are subject to change without notice and it is understood that this Company will in no way be held responsible for such changes.
12. All prices are listed at point of manufacture. Charges for boxing and packing will be made in accordance with our regular custom.

SHERARDIZING, THE NEW PROTECTIVE FINISH FOR IRON AND STEEL

In place of galvanizing, enameling, or other processes heretofore employed, a process of finishing known as Sherardizing has been adopted as standard for the protection of iron and steel line material devices. In this process, which is comparatively new, zinc is deposited by distillation upon the surface to be protected, and this zinc coating not only adheres to the surface as in hot or electrolytic galvanizing, but forms with the iron an alloy extending considerably below the surface, which resists corrosion under the most adverse weather conditions, and is proof against the tendency to scale off exhibited by the best hot galvanizing, under prolonged exposure. It withstands successfully the Preece test of successive immersions in copper sulphate solution, which is the standard form of test specified and applied by practically all telegraph and telephone companies and other large users of galvanized materials.

Sherardizing has the additional advantage of furnishing efficient protection of threaded and other finished surfaces without materially altering their dimensions, whereas, in hot galvanizing, screw threads have to be recut and the steel surface is, therefore, liable to partial exposure. It is also free from the weakening effect caused by hot galvanizing on malleable iron in certain forms, which has to some extent limited the employment of galvanizing in line material manufacture, and has often seriously impaired the integrity of castings of irregular sections.

The adoption of Sherardizing marks the most important step in the art of line material manufacture since the design of Catenary Construction.

DIMENSIONS

In this catalogue descriptions of the overhead line devices contain detail dimensions which, it is believed, will assist intending purchasers. It must be understood, however, that the dimensions given are averages and therefore subject to reasonable variation in manufacture.

DIRECT SUSPENSION LINE MATERIAL

POLE BRACKETS

The following pole brackets represent the various forms called for in modern railway line construction and include the three styles of tube, the use of which has been approved in the best practice.

The wrought iron pipe referred to in the table is standard welded gas and water pipe, and the structural tubing is a special high carbon steel tube with butt joint, which, because of the great stiffness of the material does not require a welded seam.

All diameters given are the nominal inside diameters of standard wrought iron pipe.

All parts of these brackets are finished in black japan.

The following table gives dimensions and weights of the various tubes employed.

Material	Nominal Inside Diameter	Actual Outside Diameter	Thickness of Wall	Weight in Lbs. per Ft.
Wrought Iron Pipe	1½"	1.66"	.140"	2.2
	1½"	1.90"	.145"	2.6
	2"	2.375"	.154"	3.6
"A" Tubing	1½"	1.66"	.095"	1.5
	1½"	1.90"	.095"	1.87
	2"	2.375"	.107"	2.50
"C" Tubing	1½"	1.66"	.140"	2.2
	1½"	1.90"	.145"	2.5
	2"	2.375"	.154"	3.5

Iron poles, such as are used in line construction, have actual outside diameters somewhat larger than their nominal listed diameters.

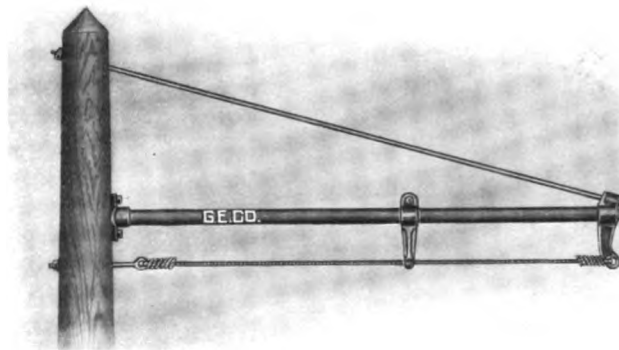
4" Standard Pipe Pole, actual outside diam.	4½ inches
5" Standard Pipe Pole, actual outside diam.	5½ inches
6" Standard Pipe Pole, actual outside diam.	6½ inches
7" Standard Pipe Pole, actual outside diam.	7½ inches

FLEXIBLE BRACKETS

For Wood Poles

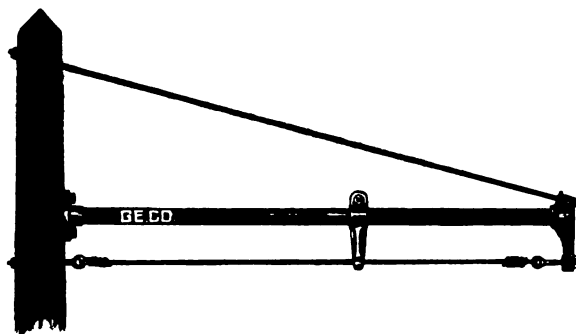
9 ft. long with Guy Rod and Galvanized Steel Cable

FORM A-1 BRACKETS



Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40009	1½" "A" tubing	3250	40012	2" "A" tubing	3450
40010	1½" "C" tubing	3800	40013	2" "C" tubing	4000
40011	1½" Wrought iron pipe	3900	40014	2" Wrought iron pipe	4100

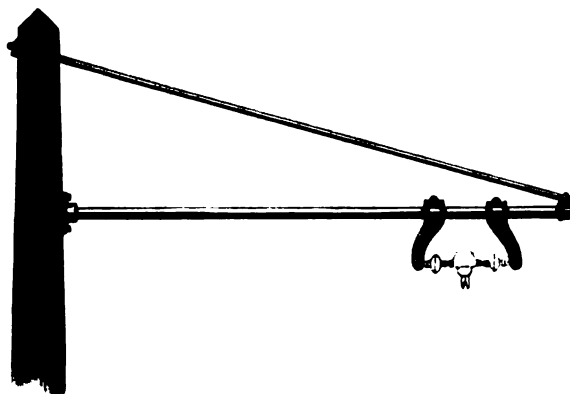
For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

POLE BRACKETS, FLEXIBLE**For Wood Poles****9 ft. long with Guy Rod and Galvanized Steel Cable****FORM A-2 BRACKETS**

This bracket differs from the Form "A-1" only in that it has additional adjustment for tension of span wire.

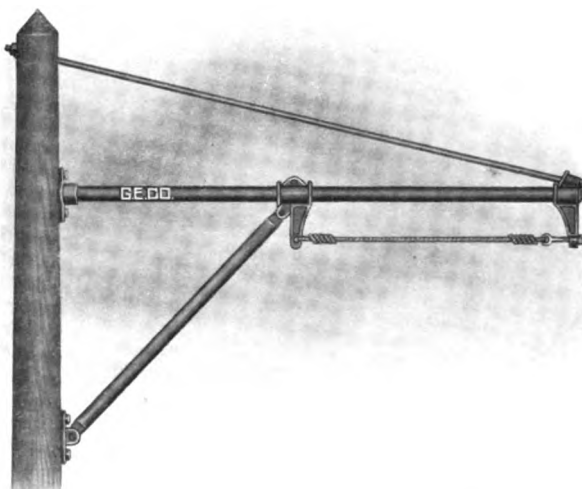
Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40015	1½" "A" tubing	3300	40018	2" "A" tubing	3500
40016	1½" "C" tubing	3850	40019	2" "C" tubing	4050
40017	1½" Wrought iron pipe	3950	40020	2" Wrought iron pipe	4150

For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

9 ft. 6 in. long for 1200 Volt Form H Suspensions**FORM A-3 BRACKETS**

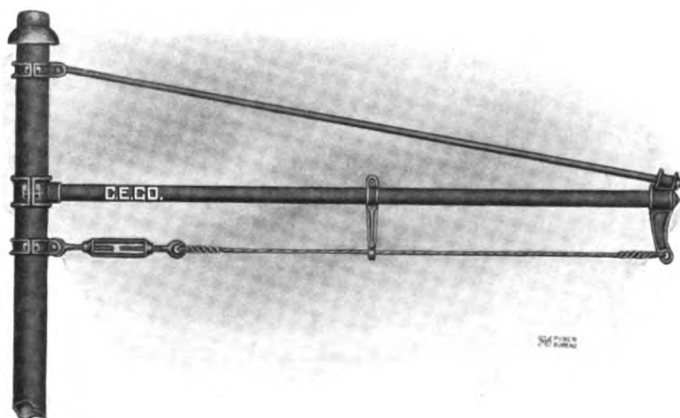
Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
100130	1½" "A" tubing	4500	100133	2" "A" tubing	4700
100131	1½" "C" tubing	5000	100134	2" "C" tubing	5200
100132	1½" Wrought iron pipe	5150	100135	2" Wrought iron pipe	5350

For Sherardized Brackets or brackets other than 9 ft. 6 in. in length, prices will be quoted on application.

POLE BRACKETS, FLEXIBLE**For Wood Poles****9 ft. long with Guy Rod and Galvanized Steel Cable
FORM B COMBINATION BRACKETS**

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40021	"A" tubing, arm 1½", strut 1½"	4150	40024	"A" tubing, arm 2", strut 1½"	5050
40022	"C" tubing, arm 1½", strut 1½"	5000	40025	"C" tubing, arm 2", strut 1½"	6250
40023	Wrought iron pipe, arm 1½", strut 1½"	5100	40026	Wrought iron pipe, arm 2", strut 1½"	6400

For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

For use with 5 in. Standard Pipe Poles**FORM A-1 BRACKETS**

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40033	1½" "A" tubing	4100	40036	2" "A" tubing	4950
40034	1½" "C" tubing	4700	40037	2" "C" tubing	5800
40035	1½" Wrought iron pipe . . .	4800	40038	2" Wrought iron pipe . . .	5900

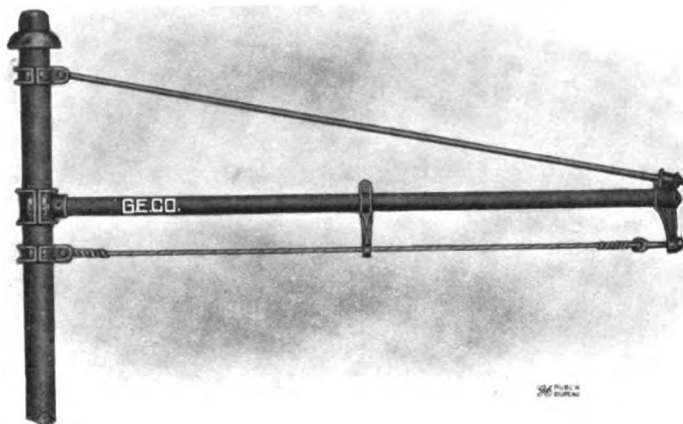
By changing pole clamps these brackets may also be used for 4", 6" or 7" poles.

For separate list of pole clamps see page 14.

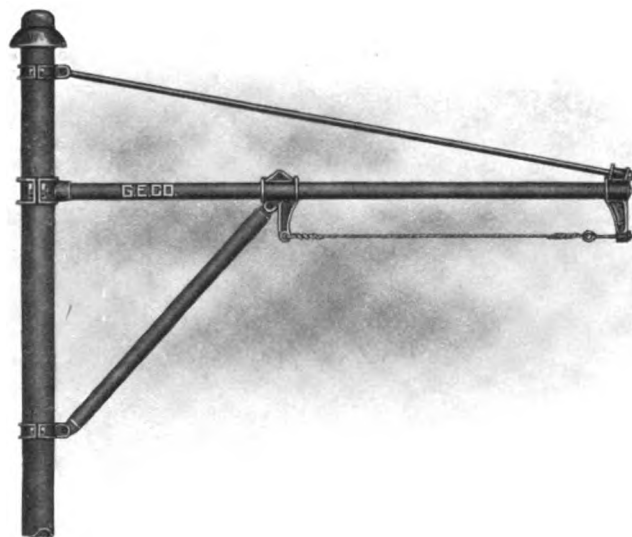
For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

POLE BRACKETS, FLEXIBLE

For use with 5 in. Standard Pipe Poles
9 ft. long with Guy Rod and Galvanized Steel Cable
FORM A-2 BRACKETS



Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40039	1½" "A" tubing	3900	40042	2" "A" tubing	4700
40040	1½" "C" tubing	4500	40043	2" "C" tubing	5600
40041	1½" Wrought iron pipe	4600	40044	2" Wrought iron pipe	5700

FORM B COMBINATION BRACKETS

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40045	"A" tubing, arm 1½", strut 1½"	5150	40048	"A" tubing, arm 2", strut 1½"	6200
40046	"C" tubing, arm 1½", strut 1½"	6050	40049	"C" tubing, arm 2", strut 1½"	7350
40047	Wrought iron pipe, arm 1½", strut 1½"	6150	40050	Wrought iron pipe, arm 2", strut 1½"	7500

By changing pole clamps these brackets may also be used for 4", 6", or 7" poles.

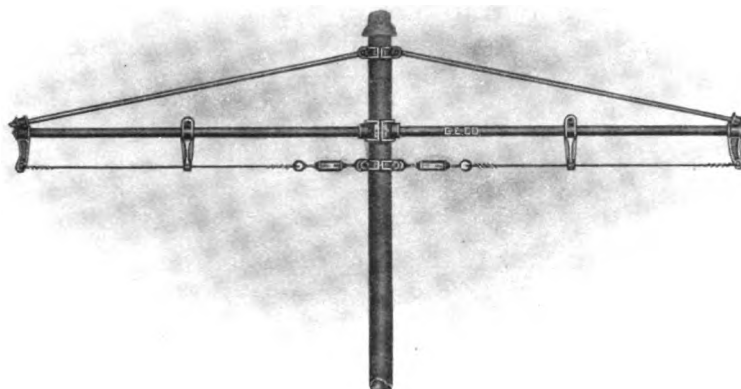
For separate list of pole clamps see page 14.

For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

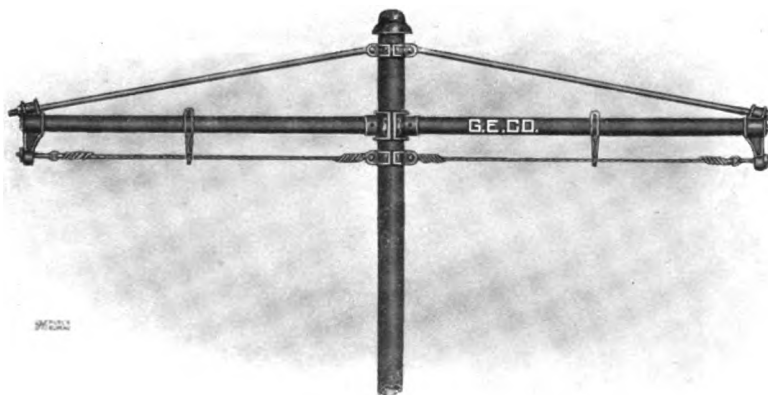
POLE BRACKETS, FLEXIBLE

For use with 5 in. Standard Pipe Poles

9 ft. arms with Guy Rod and Galvanized Steel Cable

FORM A-1 BRACKETS

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40057	1½" "A" tubing	7550	40060	2" "A" tubing	8900
40058	1½" "C" tubing	8700	40061	2" "C" tubing	10700
40059	1½" Wrought iron pipe	8900	40062	2" Wrought iron pipe	10900

FORM A-2 BRACKETS

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40063	1½" "A" tubing	7150	40066	2" "A" tubing	8500
40064	1½" "C" tubing	8300	40067	2" "C" tubing	10300
40065	1½" Wrought iron pipe	8500	40068	2" Wrought iron pipe	10500

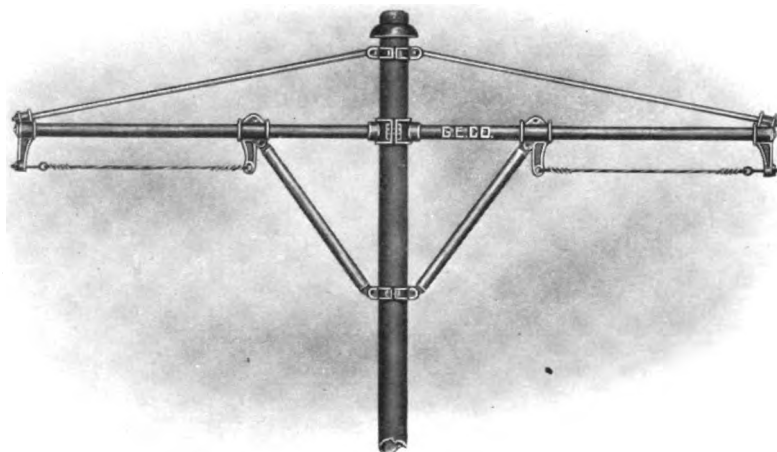
By changing pole clamps these brackets may also be used for 4", 6", or 7" poles.

For separate list of pole clamps see page 14.

For Sherardized Brackets or brackets with arms other than 9 feet in length, prices will be quoted on application.

POLE BRACKETS, FLEXIBLE

For use with 5 in. Standard Pipe Poles
9 ft. arms with Guy Rod and Galvanized Steel Cable
FORM B COMBINATION BRACKETS



Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40069	"A" tubing, arm 1½", strut 1½"	9650	40072	"A" tubing, arm 2", strut 1½"	11000
40070	"C" tubing, arm 1½", strut 1½"	10800	40073	"C" tubing, arm 2", strut 1½"	12800
40071	Wrought iron pipe, arm 1½", strut 1½"	11000	40074	Wrought iron pipe, arm 2", strut 1½"	13000

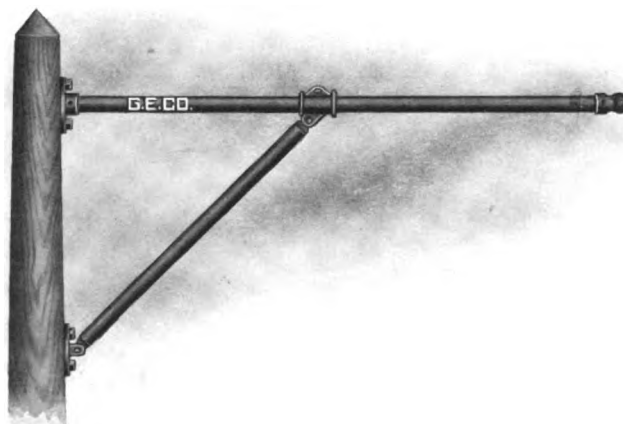
By changing pole clamps these brackets may also be used for 4", 6", or 7" poles.

For separate list of pole clamps see page 14.

For Sherardized Brackets or brackets with arms other than 9 feet in length, prices will be quoted on application.

RIGID BRACKETS—For Wood Poles

9 ft. long
FORM C BRACKETS



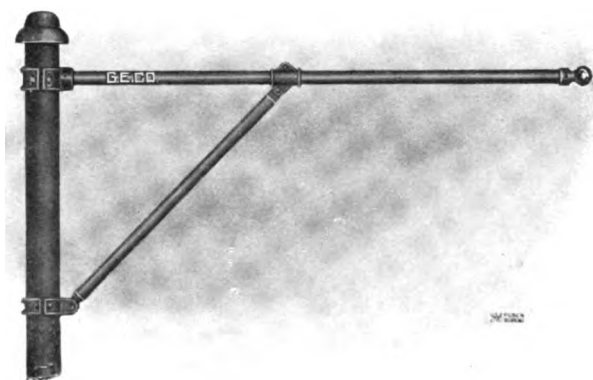
Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40027	"A" tubing, arm 1½", strut 1½"	2850	40030	"A" tubing, arm 2", strut 1½"	3800
40028	"C" tubing, arm 1½", strut 1½"	3700	40031	"C" tubing, arm 2", strut 1½"	5000
40029	Wrought iron pipe, arm 1½", strut 1½"	3800	40032	Wrought iron pipe, arm 2", strut 1½"	5100

For Sherardized Brackets or brackets other than 9 feet in length, prices will be quoted on application.

POLE BRACKETS—RIGID

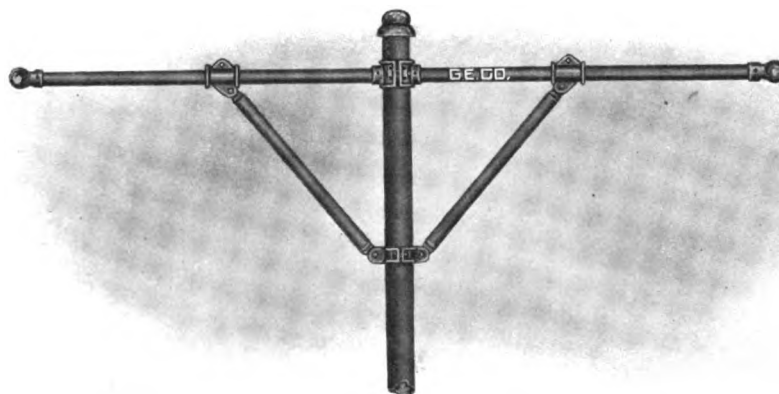
For use with 5 in. Standard Pipe Poles

9 ft. long

FORM C BRACKETS

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40051	"A" tubing, arm 1½", strut 1½"	3750	40054	"A" tubing, arm 2", strut 1½"	4700
40052	"C" tubing, arm 1½", strut 1½"	4650	40055	"C" tubing, arm 2", strut 1½"	5800
40053	Wrought iron pipe, arm 1½", strut 1½"	4900	40056	Wrought iron pipe, arm 2", strut 1½"	6000

Two, 9 ft. arms

FORM C BRACKETS

Cat. No.	Description	Approx. Weight per 100	Cat. No.	Description	Approx. Weight per 100
40075	"A" tubing, arm 1½", strut 1½"	6650	40078	"A" tubing, arm 2", strut 1½"	8200
40076	"C" tubing, arm 1½", strut 1½"	8200	40079	"C" tubing, arm 2", strut 1½"	10400
40077	Wrought iron pipe, arm 1½", strut 1½"	8500	40080	Wrought iron pipe, arm 2", strut 1½"	10700

By changing pole clamps these brackets may also be used for 4", 6", or 7" poles.

For separate list of pole clamps see page 14.

For Sherardized Brackets or brackets with arms other than 9 feet in length, prices will be quoted on application.

CLAMPS AND BANDS**For Brackets for Iron Poles****BRACKET CLAMPS****FOR HOLDING HORIZONTAL ARMS TO POLE**

CAT. NO.		Description	APPROX. WT. PER 100	
Single	Double		Single	Double
40081	40097	For 4" Standard Pipe Pole and 1½" Bracket Arms	680	775
40082	40098	For 5" Standard Pipe Pole and 1½" Bracket Arms	745	760
40083	40099	For 5" Standard Pipe Pole and 2" Bracket Arms	745	760
40084	40100	For 6" Standard Pipe Pole and 1½" Bracket Arms	980	995
40085	40101	For 6" Standard Pipe Pole and 2" Bracket Arms	980	995
40086	40102	For 7" Standard Pipe Pole and 2" Bracket Arms	1360	1405

For Sherardized clamps prices will be quoted on application.

ANGLE CLAMPS**FOR HOLDING SUPPORTING STRUTS TO POLE**

Cat. No. 40088



Cat. No. 40104

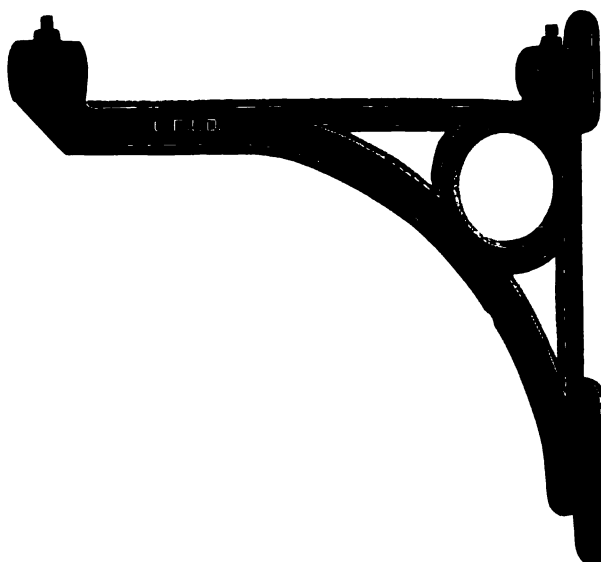
CAT. NO.		Description	APPROX. WT. PER 100	
Single	Double		Single	Double
40087	40103	For 4" Standard Pipe Pole	645	745
40088	40104	For 5" Standard Pipe Pole	655	755
40090	40106	For 6" Standard Pipe Pole	860	960
40092	40108	For 7" Standard Pipe Pole	1035	1135

For Sherardized clamps prices will be quoted on application.

POLE BANDS**FOR HOLDING GUY RODS AND SPAN WIRES TO POLE**

CAT. NO.		Description	APPROX. WT. PER 100	
Single	Double		Single	Double
40093	40109	For 4" Standard Pipe Pole	155	200
40094	40110	For 5" Standard Pipe Pole	180	225
40095	40111	For 6" Standard Pipe Pole	210	250
40096	40112	For 7" Standard Pipe Pole	230	275

For Sherardized clamps prices will be quoted on application.

POLE BRACKETS—CAST IRON**FOR SUPPORTING PIPE BRACKET ARM****Cat. No. 15037**

Cat. No.	Description	Approx. Weight per 100
15026	Short bracket for $1\frac{1}{2}$ " pipe, length $22\frac{1}{8}$ ", height $28\frac{1}{2}$ ", diam. of hole, $2\frac{1}{2}$ ".	2400
15037	Long bracket for $1\frac{1}{2}$ " pipe, length $30\frac{3}{8}$ ", height $28\frac{1}{2}$ ", diam. of hole, $2\frac{1}{2}$ ".	3100

SUSPENSIONS—FORM H

In this section are listed all forms of suspensions demanded by the varying conditions of direct suspension construction.

In general there are five forms; the Form H suspensions, consisting of malleable iron shells into which the insulation holding the studs is permanently moulded; the Form S, consisting of malleable iron yokes with strain insulators of various forms shackled to them; the Form D, or cap and cone-suspensions; the Form G, in which insulation is provided by an insulated bolt; and Form T, feeder tap suspensions.



600 Volt Straight Line Suspension

Form H suspensions consist primarily of malleable iron shells into which the insulation holding the studs is permanently moulded. A load of over five tons is required to pull the stud from this form of suspension.

STRAIGHT LINE—600 VOLTS

These are made in two sizes $3\frac{1}{4}$ in. and $3\frac{1}{2}$ in. in diameter, each of which is furnished with either $\frac{3}{8}$ in. or $\frac{1}{2}$ in. stud. The $3\frac{1}{2}$ in. suspension has extra heavy shell and arms and is designed especially for the heaviest construction.

Each of these suspensions, being in one piece, is held against turning by the span wire, and cannot, therefore, become unscrewed as a result of vibration in service.



600 Volt Straight Line Suspension

Overall length $6\frac{1}{2}$ in.; arm yokes accommodate $\frac{3}{4}$ in. span wire. Shell and stud have the standard sherardized finish.

Cat. No.	SHELL		Diameter of Stud	Approx. Weight per 100
	Dia.	Height		
25980	$3\frac{1}{4}$ "	2"	$\frac{3}{8}$ "	210
39688	$3\frac{1}{4}$ "	$2\frac{1}{4}$ "	$\frac{3}{8}$ "	215
39690	$3\frac{1}{2}$ "	$2\frac{1}{4}$ "	$\frac{3}{8}$ "	265
25979	$3\frac{1}{2}$ "	$2\frac{1}{4}$ "	$\frac{1}{2}$ "	270

STRAIGHT LINE—1200 VOLTS

These suspensions and the $3\frac{1}{2}$ in. straight line 600 volt suspensions are identical, except that the arms are replaced by clevises to which giant or wood strain insulators are shackled. A new bracket designed particularly for 1200 volt, Form H suspensions is listed on page 8.

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64425



1200 Volt Straight Line Suspension

Overall length between centers of outer eyes $12\frac{1}{4}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including the stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
66624	$\frac{3}{8}$ "	460
66622	$\frac{1}{2}$ "	465

SUSPENSIONS—FORM H**Straight Line—1200 Volts****WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 16727****1200 Volt Straight Line Suspension**

Overall length between centers of outer eyes $23\frac{3}{4}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
66620	$\frac{3}{8}$ "	565
66618	$\frac{1}{2}$ "	570

WITH $1\frac{1}{2}$ IN. WOOD STRAIN INSULATORS, CAT. No. 37488**1200 Volt Straight Line Suspension**

Overall length between centers of outer eyes $23\frac{3}{4}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
89475	$\frac{3}{8}$ "	635
89473	$\frac{1}{2}$ "	640

SUSPENSION BODY WITH PINS**FOR 1200 VOLT STRAIGHT LINE AND 600 AND 1200 VOLT DOUBLE CURVE FORM H SUSPENSIONS****Suspension Body**

Length between centers of clevis holes $4\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in.; diameter of pins $\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
66330	$\frac{3}{8}$ "	285
66326	$\frac{1}{2}$ "	290

SINGLE CURVE

The Form H Single Curve Suspension consists of a $3\frac{1}{2}$ in. body cast in $\frac{1}{2}$ in. into which the insulation holding the stud is moulded, with a clevis on one side to which the pull off arm is attached by means of a $\frac{1}{2}$ in. steel pin and cotter. For 1200 volt work, strain insulators are shackled to the pull off arm.

SUSPENSIONS—FORM H**SINGLE CURVE****600 Volt Single Curve Suspension****600 VOLTS**

Length between center line of stud and center of pull off eye $4\frac{1}{2}$ in.; height above center of pull off eye $3\frac{1}{2}$ in.; diameter of pull off eye $\frac{3}{8}$ in.; thickness of pull off arm at eye $\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68953	$\frac{5}{8}$ "	310
68955	$\frac{3}{4}$ "	315

1200 VOLTS**WITH 2 IN. GIANT STRAIN INSULATOR, CAT. No. 64417****1200 Volt Single Curve Suspension**

Length between center line of stud and center of outer eye $8\frac{1}{8}$ in.; height above center of pull off eye $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including shell have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68965	$\frac{5}{8}$ "	415
68967	$\frac{3}{4}$ "	420

WITH 1 IN. WOOD STRAIN INSULATOR, CAT. No. 43229

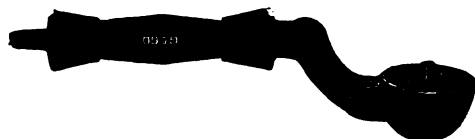
Length between center line of stud and center of outer eye $14\frac{1}{8}$ in.; height above center of pull off eye $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

**1200 Volt Single Curve Suspension**

Cat. No.	Diameter of Stud	Approx. Weight per 100
68945	$\frac{5}{8}$ "	470
68947	$\frac{3}{4}$ "	475

WITH 1 1/4 IN. WOOD STRAIN INSULATOR, CAT. No. 43230

Length between center line of stud and center of outer eye $14\frac{1}{8}$ in.; height above center of pull off eye $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

**1200 Volt Single Curve Suspension**

Cat. No.	Diameter of Stud	Approx. Weight per 100
89485	$\frac{5}{8}$ "	495
89487	$\frac{3}{4}$ "	500

SUSPENSIONS—FORM H**SUSPENSION BODY—WITH PIN****FOR 600 AND 1200 VOLT SINGLE CURVE FORM H SUSPENSIONS****Suspension Body**

Distance between center line of stud and center of clevis hole $2\frac{3}{8}$ in.; diameter of shell $3\frac{1}{2}$ in.; height of shell $2\frac{1}{4}$ in.; diameter of pin $\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68961	$\frac{3}{4}$ "	255
68963	$\frac{1}{2}$ "	260

DOUBLE CURVE

The Form H double curve suspensions are like the single curve suspensions, except that there are two clevises and arms.

600 VOLTS

Length between centers of pull off eyes 9 in.; height above center of pull off eyes $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in.; diameter of pull off eyes $\frac{1}{8}$ in.; thickness of pull off arms at eyes $\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

**600 Volt Double Curve Suspension**

Cat. No.	Diameter of Stud	Approx. Weight per 100
68957	$\frac{3}{4}$ "	395
68959	$\frac{1}{2}$ "	400

1200 VOLTS

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64417

**1200 Volt Double Curve Suspension**

Length between centers of pull off eyes $17\frac{3}{4}$ in.; height above centers of pull off eyes $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68969	$\frac{3}{4}$ "	605
68971	$\frac{1}{2}$ "	610

SUSPENSIONS—FORM H**WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 43229****1200 Volt Double Curve Suspension**

Length between centers of pull off eyes $28\frac{3}{4}$ in.; height above centers of pull off eyes $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68949	$\frac{3}{8}$ "	715
68951	$\frac{1}{2}$ "	720

WITH 1 1/4 IN. WOOD STRAIN INSULATORS, CAT. No. 43230**1200 Volt Double Curve Suspension**

Length between centers of pull off eyes $28\frac{3}{4}$ in.; height above centers of pull off eyes $3\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
89489	$\frac{3}{8}$ "	765
89491	$\frac{1}{2}$ "	770

BRIDGE OR CEILING—600 VOLTS

These suspensions have a total height of 2 inches above the ear seat. The supporting ears are slotted for $\frac{1}{2}$ inch lag screws or bolts.

**Ceiling Suspension**

Distance between centers of screw slots $4\frac{1}{2}$ in.; thickness of slotted ears $\frac{3}{4}$ in.; diameter of shell $3\frac{1}{2}$ in. Shell and stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
27370	$\frac{3}{8}$ "	230
40961	$\frac{1}{2}$ "	245

LOW BRIDGE OR CEILING AND LOW MINING — 600 VOLT

To produce a suspension of minimum height and a long creepage surface together with high mechanical strength, an entirely new feature has been introduced into the manufacture of both the Low Bridge or Ceiling Suspension and the Low Mining Suspension. The new feature is the "crimped cup" method of clamping the stud into the shell—the method being similar to that employed in the manufacture of Giant Strain Insulators. The insulation between the shell and the stud cap is sheet mica, $\frac{1}{8}$ in. thick, with a fibre backing.

This design throws the entire mechanical load on to the malleable iron cup which is of ample strength to care for the greatest loads possible under operating conditions; thus the moulded insulation, used to give the long creepage surface, is entirely relieved of mechanical strains.

SUSPENSIONS—FORM H**LOW BRIDGE CEILING SUSPENSION**

The Low Bridge or Ceiling Suspension is for use under bridges and elevated structures where head room is limited. The top of Cat. No. 64560 is designed to be countersunk in the supporting timber, bringing the top of the ear hub $\frac{1}{4}$ in. below the bottom of the timber. Cat. No. 105705 has the supporting arms at its top so that it may be attached to the overhead structure without countersinking; its total height above the ear seat is $1\frac{1}{4}$ in.; $\frac{1}{2}$ in. screws are required for the supporting arms. Shell and stud have standard sherardized finish.



Cat. No. 105705



Cat. No. 64560

Cat. No.	Description	Approx. Weight per 100
64560	Low bridge ceiling suspension Form H, $\frac{3}{8}$ " stud with arms at bottom	150
105705	Low bridge ceiling suspension Form H, $\frac{3}{8}$ " stud with arms at top	150

LOW MINING SUSPENSION

This mining suspension is like the Low Bridge Suspension in its internal design and will be found useful in many places where the suspension shown at the bottom of the page is too high. The Low Mining Suspension is adapted to use with the standard roof bolt and wedges or with the expansion bolts listed on page 22. Shell and stud have the standard sherardized finish.



Low Mining Suspension

Height from ear seat to top of shell $1\frac{1}{4}$ in.; diameter of shell at top 3 in.; height of boss above shell $\frac{1}{8}$ in.

Cat. No.	Description	Approx. Weight per 100
64561	Low Mining Suspension $\frac{3}{8}$ " stud	150

MINING

The height of the Form H Mining Suspension, from the ear seat to the top of the shell is 2 inches.

The extended flange at the top gives wide bearing surface against the mine roof to resist transverse stress on curves and the sides are grooved for the reception of a wrench with which the suspension can be set up tight on the roof bolt. The double petticoat provides ample leakage surface for voltages up to 600.

In the following tables mining suspensions are listed with several different arrangements for fastening into the mine roof, and for convenience in ordering repair parts, the insulating portion is listed also separately.



Mining Suspension

Diameter of top flange 4 in; diameter of shell $3\frac{1}{2}$ in.; height from ear seat to top of flange 2 in. Shell and stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
35688	$\frac{3}{8}$ "	250
40965	$\frac{1}{2}$ "	255

SUSPENSIONS—FORM H

MINING

WITH ROOF BOLT AND WEDGES



Mining Suspension

This suspension consists of the standard Form H mining suspension, with a 5 in. roof bolt and two expansion wedges. The bolt is slotted near the top and the upper wedge is arranged to engage it so as to prevent turning of the bolt in screwing up the suspension. When the suspension is removed from the bolt the whole device is loosened in the hole by a blow with a hammer and may thus be readily recovered.

The roof drilling should be $1\frac{3}{8}$ in. in diameter and at least 5 in. deep. All metal parts including stud have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
35686	Mining Suspension complete, $\frac{3}{4}$ " stud	370
40963	Mining Suspension complete, $\frac{1}{2}$ " stud	375
35689	Roof bolt ($\frac{3}{8}$ "-11, 5" special)	40
35690	Upper roof wedge	45
35691	Lower roof wedge	35

WITH 4 IN. EXPANSION BOLT

The suspensions listed in the following table are made up of the standard Form H suspension, with a 4 in. expansion bolt consisting of a malleable iron shell, $1\frac{1}{4}$ in. in diameter, a roof bolt and a conical nut by means of which the shell is expanded when in position. The roof bolt being properly seated in the suspension boss, the shell is readily expanded in the roof hole by a few turns of the suspension.

The roof drilling should be $1\frac{1}{4}$ in. in diameter and at least 5 in. deep.

Expansion bolts Cat. Nos. 100409 and 100410 are furnished as alternatives for Cat. Nos. 66334 and 66336 when so desired. The whole difference consists in the addition of a hexagonal shaped shoulder on the roof bolt which is of service in recovering the expansion bolt from the hole. All metal parts including stud have standard sherardized finish.



Mining Suspension

Cat. No.	Description	Approx. Weight per 100
68941	Mining Suspension complete, $\frac{3}{4}$ " stud	350
68943	Mining Suspension complete, $\frac{1}{2}$ " stud	355
66334	Expansion bolt, 4" long, with stud (threaded $\frac{3}{8}$ "-11)	100
66336	Expansion bolt, 6" long, with stud (threaded $\frac{3}{8}$ "-11)	110
100409	Expansion bolt, 4" long, with stud (threaded $\frac{3}{8}$ "-11) having hexagonal shoulder	105
100410	Expansion bolt, 6" long, with stud (threaded $\frac{3}{8}$ "-11) having hexagonal shoulder	115

SUSPENSIONS—FORM H

MINING

WITH LAG SCREW AND WOOD PLUG

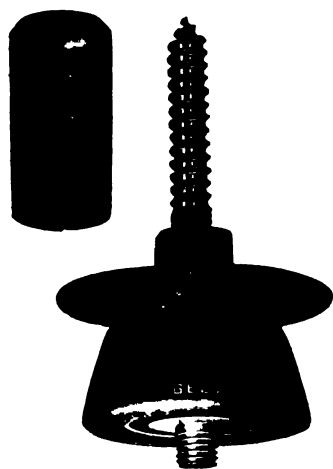
This suspension consists of the standard Form H mining suspension, with a gimlet point lag screw threaded and rusted in the top and projecting 3 in. above the tapped boss.

It is used in connection with a wooden plug, Cat. No. 34137, which is drilled axially for the lag screw. The plug is driven into a hole drilled in the mine roof and the lag screwed into the plug, its taper splitting the wood and expanding it permanently in place.

The roof drilling should be $1\frac{1}{2}$ in. in diameter and 4 in. deep.

This is also an excellent ceiling suspension for use in timbered entries, or in car-barn wiring as the lag can be screwed into the roof timbers.

The lag screw, shell and stud have standard sherardized finish.



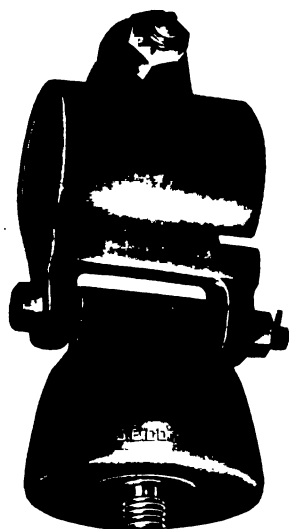
Mining Suspension

Cat. No.	Description	Approx. Weight per 100
34136	Mining Suspension complete, $\frac{3}{8}$ " stud	275
40967	Mining Suspension complete, $\frac{1}{2}$ " stud	280
34137	Wooden plug (3" x $1\frac{1}{2}$ ")	10
36310	Lag Screw ($\frac{3}{8}$ " x $3\frac{1}{2}$ " special)	25

BRACKET

The Form H bracket suspension consists of the standard $3\frac{1}{2}$ in. shell to which the bracket arm clamp is hinged, thus providing the flexibility required to care for vibration in the trolley wire.

For suspensions for 2 in. pipe the height from ear seat to center of bracket arm clamp is $5\frac{1}{2}$ in.; for $1\frac{1}{2}$ in. pipe the height is $4\frac{1}{2}$ in.; diameter of shell $3\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.



Bracket Suspension

Cat. No.	Description	Approx. Weight per 100
25992	Bracket Suspension complete, $\frac{3}{8}$ " stud for 2" pipe	540
25993	Bracket Suspension complete, $\frac{3}{8}$ " stud for $1\frac{1}{2}$ " pipe	530
25994	Bracket Suspension, $\frac{3}{8}$ " stud, without clamp	275
25996	Clamp for 2" pipe, for use with Cat. No. 25992	265
25997	Clamp for $1\frac{1}{2}$ " pipe, for use with Cat. No. 25993	255

The clamps for the Form H Bracket Suspensions are the same as those used with Form G Bracket Suspensions.

SUSPENSIONS—FORM S

These suspensions consist of liberally designed malleable iron yokes fitted with 2 in. giant strain insulators or wood strain insulators either 1 in. or $1\frac{1}{4}$ in. in diameter. If other insulators are desired, bodies and insulators should be ordered separately.

SINGLE TROLLEY

STRAIGHT LINE—600 VOLTS

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64425

Length between centers of outer eyes $15\frac{5}{8}$ in. All metal parts including stud have standard sherardized finish.



600 Volt Straight Line Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
66648	$\frac{5}{8}$ "	410
66646	$\frac{3}{4}$ "	415

WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 16727

Length between centers of outer eyes 27 in. All metal parts including stud have standard sherardized finish.



600 Volt Straight Line Suspension

Cat. No.	Diameter of Stud	Approx. Wt. per 100
66640	$\frac{5}{8}$ "	515
66638	$\frac{3}{4}$ "	520

WITH 1 $\frac{1}{4}$ IN. WOOD STRAIN INSULATORS, CAT. No. 37488

Length between centers of outer eyes 27 in. All metal parts including stud have standard sherardized finish.



600 Volt Straight Line Suspension

Cat. No.	Diameter of Stud	Approx. Wt. per 100
89483	$\frac{5}{8}$ "	585
89481	$\frac{3}{4}$ "	590

STRAIGHT LINE—1200 VOLTS

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. NOS. 64425 AND 64417



1200 Volt Straight Line Suspension

Length between centers of outer eyes 24 in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
100120	$\frac{5}{8}$ "	620
100118	$\frac{3}{4}$ "	625

SUSPENSIONS—FORM S

BODIES FOR STRAIGHT LINE SUSPENSIONS

COMPLETE WITH BOLTS, WASHERS AND PINS

Length between pin centers 8 in.; clevis opening $\frac{1}{8}$ in.; diameter of pins $\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.



Straight Line Suspension Body

Cat. No.	Diameter of Stud	Approx. Weight per 100
66632	$\frac{5}{8}$ "	235
66630	$\frac{3}{4}$ "	240

SINGLE CURVE—600 VOLTS

WITH 2 IN. GIANT STRAIN INSULATOR, CAT. No. 64425

Length between center line of stud to center of outer eye 9 in. All metal parts including stud have standard sherardized finish.



600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
25987	$\frac{5}{8}$ "	240
25983	$\frac{3}{4}$ "	245

WITH 1 IN. WOOD STRAIN INSULATOR, CAT. No. 16727

Length between center line of stud to center of outer eye $14\frac{1}{8}$ in. All metal parts including stud have standard sherardized finish.

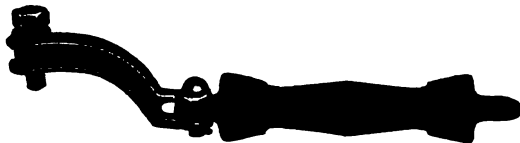


600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
33958	$\frac{5}{8}$ "	295
33954	$\frac{3}{4}$ "	300

WITH 1 1/4 IN WOOD STRAIN INSULATOR, CAT. No. 37488

Length between center line of stud to center of outer eye $14\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.



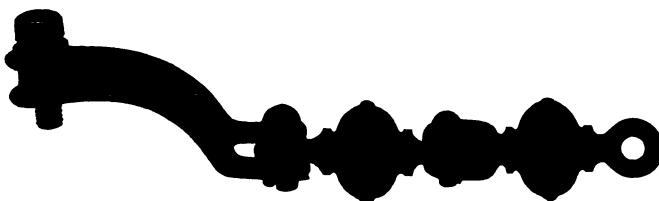
600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
64252	$\frac{5}{8}$ "	330
64251	$\frac{3}{4}$ "	335

SINGLE CURVE—1200 VOLTS

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. NOS. 64425 AND 64417

Length between center line of stud and center of outer eye $13\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.



1200 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
68166	$\frac{5}{8}$ "	345
68165	$\frac{3}{4}$ "	350

SUSPENSIONS—FORM S

BODIES FOR SINGLE CURVE SUSPENSIONS

COMPLETE WITH BOLTS, WASHERS AND PINS

Length between center line of stud and center of pin $5\frac{1}{4}$ in.; clevis opening $\frac{1}{8}$ in.; diameter of pin $\frac{1}{2}$ in. Standard sherardized finish throughout.



Single Curve
Suspension Body

Cat. No.	Diameter of Stud	Approx. Weight per 100
64244	$\frac{5}{8}$ "	155
64243	$\frac{3}{4}$ "	160

DOUBLE CURVE—600 VOLTS

WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64425

Length between centers of outer eyes 18 in. All metal parts including stud have standard sherardized finish.



600 Volt Double Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
25988	$\frac{5}{8}$ "	410
25986	$\frac{3}{4}$ "	415

WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 16727

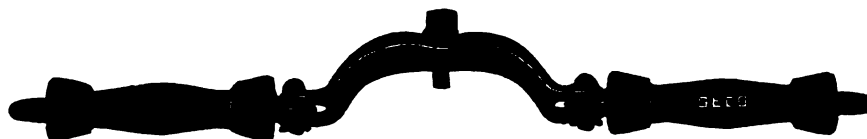


600 Volt Double Curve Suspension

Length between centers of outer eyes $29\frac{1}{4}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
33960	$\frac{5}{8}$ "	515
33956	$\frac{3}{4}$ "	520

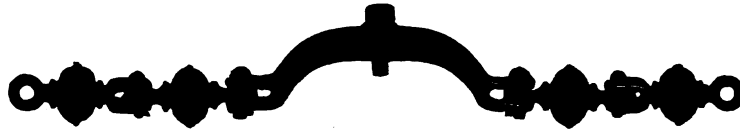
WITH 1 1/4 IN. WOOD STRAIN INSULATORS, CAT. No. 37488



600 Volt Double Curve Suspension

Length between centers of outer eyes $29\frac{1}{4}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
64254	$\frac{5}{8}$ "	585
64253	$\frac{3}{4}$ "	590

SUSPENSIONS—FORM S**Single Trolley****DOUBLE CURVE—1200 VOLTS****WITH 2 IN. GIANT STRAIN INSULATORS, CAT. NOS. 64425 AND 64417****1200 Volt Double Curve Suspension**Length between centers of outer eyes $26\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68168	$\frac{3}{8}$ "	620
68167	$\frac{1}{2}$ "	625

BODIES FOR DOUBLE CURVE SUSPENSIONS**COMPLETE WITH BOLTS, WASHERS AND PINS**Length between centers of pins $10\frac{1}{2}$ in.; clevis opening $\frac{7}{8}$ in.; diameter of pins $\frac{1}{2}$ in. Standard sherardized finish throughout.**Double Curve Suspension Body**

Cat. No.	Diameter of Stud	Approx. Weight per 100
64246	$\frac{3}{8}$ "	235
64245	$\frac{1}{2}$ "	240

Double TrolleyThe stud bolts in all Form S double trolley suspensions are spaced $6\frac{1}{2}$ in. between centers.**STRAIGHT LINE—600 VOLTS****WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64425****600 Volt Straight Line Suspension**Length between centers of outer eyes $22\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
66644	$\frac{3}{8}$ "	555
66642	$\frac{1}{2}$ "	565

SUSPENSIONS—FORM S**Double Trolley
STRAIGHT LINE****WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 16727****600 Volt Straight Line Suspension**

Length between centers of outer eyes $33\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
66636	$\frac{5}{8}$ "	660
66634	$\frac{3}{4}$ "	670

WITH 1 1/4 IN. WOOD STRAIN INSULATORS, CAT. No. 37488**600 Volt Straight Line Suspension**

Length between centers of outer eyes $33\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
89479	$\frac{5}{8}$ "	730
89477	$\frac{3}{4}$ "	740

1200 VOLTS**WITH 2 IN. GIANT STRAIN INSULATORS, CAT. NOS. 64425 AND 64417****1200 Volt Straight Line Suspension**

Length between centers of outer eyes $30\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
100124	$\frac{5}{8}$ "	765
100122	$\frac{3}{4}$ "	775

BODIES FOR STRAIGHT LINE SUSPENSIONS**COMPLETE WITH BOLTS, WASHERS AND PINS**

Length between pin centers $14\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in.; clevis opening $\frac{1}{8}$ in.; diameter of pins $\frac{1}{2}$ in. Standard sherardized finish throughout.

**Straight Line Suspension Body**

Cat. No.	Diameter of Stud	Approx. Weight per 100
66628	$\frac{5}{8}$ "	380
66626	$\frac{3}{4}$ "	390

SUSPENSIONS—FORM S**Double Trolley****SINGLE CURVE—600 VOLTS****WITH 2 IN. GIANT STRAIN INSULATOR, CAT. No. 64425**

Length between center line of outer stud and center of outer eye $15\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.



600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
27377	$\frac{3}{8}$ "	350
27374	$\frac{1}{2}$ "	360

WITH 1 IN. WOOD STRAIN INSULATOR, CAT. No. 16727

Length between center line of outer stud and center of outer eye $21\frac{1}{8}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.



600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
33966	$\frac{3}{8}$ "	405
33962	$\frac{1}{2}$ "	415

WITH 1 1/4 IN. WOOD STRAIN INSULATOR, CAT. No. 37488

Length between center line of outer stud and center of outer eye $21\frac{1}{8}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.



600 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
64256	$\frac{3}{8}$ "	440
64255	$\frac{1}{2}$ "	450

SINGLE CURVE—1200 VOLTS**WITH 2 IN. GIANT STRAIN INSULATOR, CAT. NOS. 64425 AND 64417**

Length between center line of outer stud and center of outer eye $19\frac{1}{4}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.



1200 Volt Single Curve Suspension

Cat. No.	Diameter of Stud	Approx. Weight per 100
68170	$\frac{3}{8}$ "	455
68169	$\frac{1}{2}$ "	465

BODIES FOR SINGLE CURVE SUSPENSIONS**COMPLETE WITH BOLTS, WASHERS AND PINS**

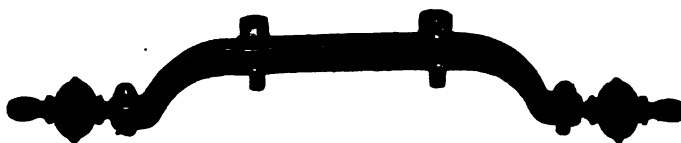
Length between center line of outer stud and center of pin $11\frac{1}{4}$ in.; distance between stud centers $6\frac{1}{2}$ in.; clevis opening $\frac{3}{8}$ in.; diameter of pin $\frac{1}{2}$ in. Standard sherardized finish throughout.



Single Curve Suspension Body

Cat. No.	Diameter of Stud	Approx. Weight per 100
64248	$\frac{3}{8}$ "	265
64247	$\frac{1}{2}$ "	275

SUSPENSIONS—FORM S
DOUBLE CURVE—600 VOLTS
WITH 2 IN. GIANT STRAIN INSULATORS, CAT. No. 64425



600 Volt Double Curve Suspension

Length between centers of outer eyes $24\frac{1}{2}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
27376	$\frac{5}{8}$ "	570
27375	$\frac{3}{4}$ "	580

WITH 1 IN. WOOD STRAIN INSULATORS, CAT. No. 16727



600 Volt Double Curve Suspension

Length between centers of outer eyes $36\frac{1}{4}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
33968	$\frac{5}{8}$ "	675
33964	$\frac{3}{4}$ "	685

WITH 1 1/4 IN. WOOD STRAIN INSULATORS, CAT. No. 37488



600 Volt Double Curve Suspension

Length between centers of outer eyes $36\frac{1}{4}$ in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
64258	$\frac{5}{8}$ "	745
64257	$\frac{3}{4}$ "	755

SUSPENSIONS—FORM S**DOUBLE CURVE—1200 VOLTS**

WITH 2 IN. GIANT STRAIN INSULATORS CAT. NOS. 64425 AND 64417

**1200 Volt Double Curve Suspension**

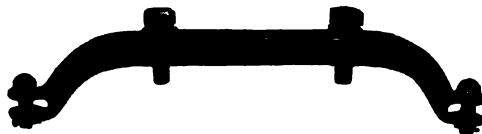
Length between centers of outer eyes 33 in.; distance between stud centers $6\frac{1}{2}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Diameter of Stud	Approx. Weight per 100
68172	$\frac{3}{8}$ "	780
68171	$\frac{1}{2}$ "	790

BODIES FOR DOUBLE CURVE SUSPENSIONS

COMPLETE WITH BOLTS, WASHERS AND PINS

Length between centers of pins 17 in.; distance between stud centers $6\frac{1}{2}$ in.; clevis opening $\frac{1}{8}$ in.; diameter of pin $\frac{1}{2}$ in. Standard sherardized finish throughout.

**Double Curve Suspension Body**

Cat. No.	Diameter of Stud	Approx. Weight per 100
64250	$\frac{3}{8}$ "	395
64249	$\frac{1}{2}$ "	405

BOLTS, WASHERS AND PINS WITH STANDARD SHERARDIZED FINISH

FOR FORM S SUSPENSIONS—STRAIGHT LINE, SINGLE AND DOUBLE CURVE

Cat. No.	Description	Approx. Weight per 100
51890	Bolt, 2" long, $\frac{3}{8}$ "-11, hexagonal head	
51889	Bolt, 2" long, $\frac{1}{2}$ "-10, hexagonal head	
27442	Lock washer for $\frac{3}{8}$ " bolt	
27441	Lock washer for $\frac{1}{2}$ " bolt	
100216	$\frac{1}{2}$ " Round head pin with cotter	

SUSPENSIONS—FORM D



Section of Form D Suspension

The Form D Suspensions are recommended only for voltages up to and including 600.

In the Form D suspensions the cap, cone and malleable iron body casting (also the lock washer when ordered) are assembled as shown in the sectional view above. The cap and cone dovetail together in such a way as to prevent the formation of a film of moisture between them. The stud bolt head is made considerably larger than the opening in the body casting so that accidental breakage of the insulation will not allow the trolley wire to fall. A dead load of over six tons is required to crush the insulation between the stud cap and body.

The lock washer, which is supplied only when specially ordered, engages directly with the screw cap and the body and effectively prevents any tendency to unscrew from vibration.

CAP AND CONE INSULATORS

For convenience in ordering parts, caps, cones and lock washers are listed separately in the following table. They are interchangeable for all Form D suspensions having studs of corresponding diameter.

The bodies are listed separately in the tables of complete suspensions.

All studs, bodies and lock washers have standard sherardized finish.



Cap



Cone



Lock Washer

Cat. No.	Description	Approx. Weight per 100
16925	Screw cap insulator, $\frac{3}{8}$ " stud	70
16926	Cone for No. 16925	25
26143	Screw cap insulator, $\frac{1}{2}$ " stud	75
26144	Cone for No. 26143	25
19480	Lock washer for all Form D suspensions	3

SUSPENSIONS—FORM D**Single Trolley****STRAIGHT LINE**

Overall length $6\frac{1}{2}$ in.; height above ear seat $2\frac{1}{8}$ in.; arm yokes accommodate $\frac{3}{8}$ in. span wire. Stud and body have standard sherardized finish.



Straight Line Suspension

Cat. No.	Description	Approx. Weight per 100
37979	Straight line suspension, $\frac{5}{8}$ " stud	195
37981	Straight line suspension, $\frac{3}{4}$ " stud	200
39700	Straight line body	100

SINGLE CURVE

Distance between center line of stud and center of pull off eye $4\frac{1}{8}$ in.; diameter of pull off eye $\frac{1}{8}$ in.; thickness of arm at eye $\frac{1}{2}$ in. Stud and body have standard sherardized finish.



Single Curve Suspension

Cat. No.	Description	Approx. Weight per 100
37983	Single curve suspension, $\frac{5}{8}$ " stud	245
37984	Single curve suspension, $\frac{3}{4}$ " stud	250
39701	Single curve body	150

DOUBLE CURVE

Double Curve Suspension

Length between centers of eyes $9\frac{1}{2}$ in.; diameter of pull off eye $\frac{1}{8}$ in.; thickness of arms at eyes $\frac{1}{2}$ in. Stud and body have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
37986	Double curve suspension, $\frac{5}{8}$ " stud	295
37988	Double curve suspension, $\frac{3}{4}$ " stud	300
39702	Double curve body	200



Ceiling Suspension

CEILING

Height above ear seat $2\frac{7}{8}$ in.; diameter of screw holes $\frac{1}{8}$ in. Stud and body have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
37991	Ceiling suspension, $\frac{5}{8}$ " stud	350
37993	Ceiling suspension, $\frac{3}{4}$ " stud	355
39703	Ceiling body	250

SUSPENSIONS—FORM D**SINGLE TROLLEY****Strain Suspension****STRAIN**

Overall length $7\frac{1}{2}$ in.; diameter of pull off eyes $\frac{1}{4}$ in.; arm yokes accommodate $\frac{3}{4}$ in. span wire. Stud and body have standard sherardized finish.

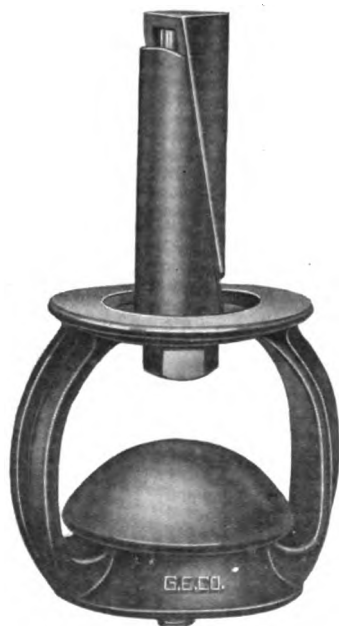
Cat. No.	Description	Approx. Weight per 100
37997	Strain suspension, $\frac{3}{8}$ " stud	245
60015	Strain suspension, $\frac{1}{2}$ " stud	250
39705	Strain body	150

MINING

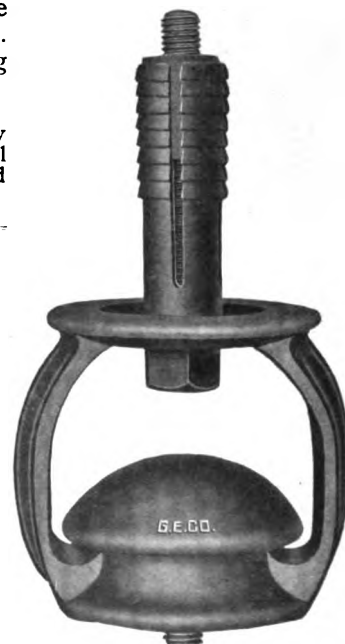
The height of the Form D mining suspension from the top of the ear seat to the top of the body is $4\frac{5}{8}$ inches.

The suspensions are listed with both roof bolt and wedges, and with the 4 in. expansion bolt; for the former the roof drilling should be $1\frac{3}{8}$ in. in diameter, and for the latter $1\frac{1}{4}$ in. in diameter; the depth of the hole being at least 4 in. in either case.

Greatest diameter 5 in.; diameter of top body flange 4 in.; height of body $4\frac{5}{8}$ in. All metal parts including studs have standard sherardized finish.

**Mining Suspension With Roof Bolt and Wedges**

Cat. No.	Description	Approx. Weight per 100
37995	Mining suspension, $\frac{3}{8}$ " stud with roof bolt and wedges	510
40969	Mining suspension, $\frac{1}{2}$ " stud with roof bolt and wedges	515
68937	Mining suspension, $\frac{3}{8}$ " stud with 4" expansion bolt	490
68939	Mining suspension, $\frac{1}{2}$ " stud with 4" expansion bolt	495
39704	Mining body	285
41069	Roof bolt ($\frac{1}{2}$ "-11, 5" special) with nut	50
35690	Upper roof wedge	45
35691	Lower roof wedge	35
68397	Expansion bolt, 4" long with nut	110

**Mining Suspension With Expansion Bolt****Bracket Suspension****BRACKET**

For suspensions for 2 in. pipe the height from ear seat to center of bracket arm clamp is $3\frac{1}{2}$ in.; for $1\frac{1}{2}$ in. pipe the height is $3\frac{1}{4}$ in. All metal parts including studs have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
38005	Bracket Suspension, $\frac{3}{8}$ " stud, for 2" pipe	400
60016	Bracket Suspension, $\frac{1}{2}$ " stud, for 2" pipe	405
38008	Bracket Suspension, $\frac{3}{8}$ " stud, for $1\frac{1}{2}$ " pipe	375
60017	Bracket Suspension, $\frac{1}{2}$ " stud, for $1\frac{1}{2}$ " pipe	380
39706	Bracket Body, for 2" pipe	305
39707	Bracket Body, for $1\frac{1}{2}$ " pipe	280

SUSPENSIONS—FORM D**DOUBLE TROLLEY**

The Form D Double Trolley Suspensions are particularly suited for use where there is a difference of potential between the two wires, inasmuch as they insulate the wires from each other. This separate insulation of the wires is essential where they are fed from different sources, for example, where two companies operate over the same track.

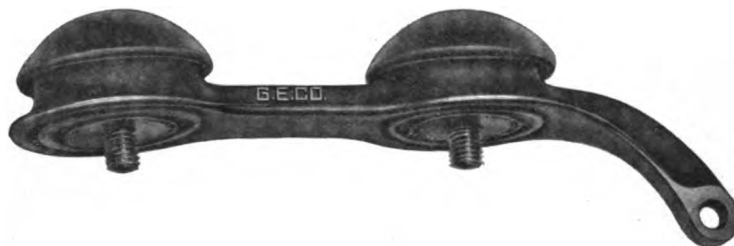
The distance between centers is $6\frac{1}{2}$ in. which allows ample space for frog and crossing devices where double trolley turnouts are installed.

The bodies are heavier throughout than the bodies of corresponding single trolley suspensions and are fully adequate to the stresses of the heaviest line construction.

STRAIGHT LINE**Straight Line Suspension**

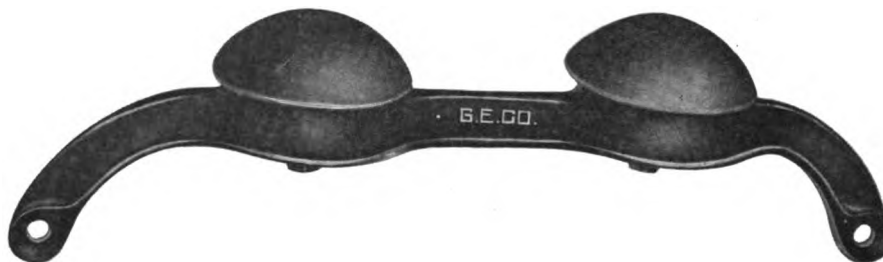
Overall length $13\frac{1}{4}$ in.; distance between centers of studs $6\frac{1}{2}$ in.; arm yokes accommodate $\frac{3}{8}$ in. span wire. Studs and body have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
38010	Straight Line Suspension, $\frac{3}{8}$ " stud	470
38012	Straight Line Suspension, $\frac{1}{2}$ " stud	480
39708	Straight Line Body	280

SINGLE CURVE**Single Curve Suspension**

Length between center line of outer stud and center of pull off eye $11\frac{1}{4}$ in.; distance between centers of studs $6\frac{1}{2}$ in.; diameter of pull off eye $\frac{1}{8}$ in.; thickness of pull off arm at eye $\frac{1}{2}$ in. Studs and body have standard sherardized finish.

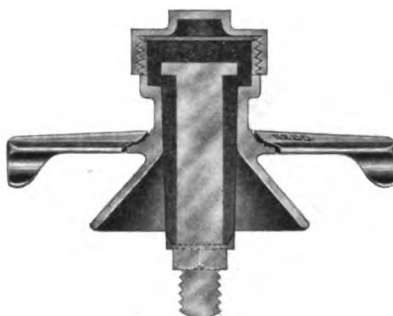
Cat. No.	Description	Approx. Weight per 100
38014	Double Trolley, Single Curve Suspension, $\frac{3}{8}$ " stud	500
38016	Double Trolley, Single Curve Suspension, $\frac{1}{2}$ " stud	510
39709	Double Trolley, Single Curve Body	310

SUSPENSIONS—FORM D**DOUBLE CURVE****Double Curve Suspension**

Length between centers of pull off eyes $15\frac{1}{4}$ in.; distance between centers of studs $6\frac{1}{2}$ in.; diameter of pull off eyes $\frac{1}{8}$ in.; thickness of pull off arms at eye $\frac{1}{2}$ in. Studs and body have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
39927	Double Trolley, Double Curve Suspension, $\frac{5}{8}$ " stud	565
39928	Double Trolley, Double Curve Suspension, $\frac{3}{4}$ " stud	575
39710	Double Trolley, Double Curve Body	375

SUSPENSIONS—FORM G



Section of Form G Suspension

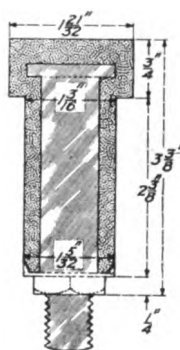
The Form G Suspensions consist of malleable iron castings and insulated bolts assembled as indicated in the sectional view. The insulated bolt is held firmly in place by a cap casting threaded to the body casting. A dead load of over 6 tons is required to crush the insulation between the stud cap of the insulated bolt and the body casting. Particular attention is called to a new feature of the insulated bolt: The shoulder of the forged steel bolt is undercut providing a considerable recess into which the insulating compound is moulded. The effect of the undercut is to provide a flange which very effectively binds the compound to the bolt at the point which otherwise would be weakest.

INSULATED BOLTS

Insulated Bolts, Cat. Nos. 17207 and 62561 are interchangeable for all Form G suspensions, having studs of corresponding diameter, and fit all standard ears except the automatic ear, Cat. No. 17338, for which a special insulated bolt, Cat. No. 17341, with pointed stud is provided. All three insulated bolts are alike excepting in their studs. The studs have standard sherardized finish.



Cat. No. 17207



Cross Section of Insulated Bolts



Cat. No. 17341

Cat. No.	Description	Approx. Weight per 100
17207	Insulated Bolt, $\frac{1}{8}$ " stud	90
62561	Insulated Bolt, $\frac{3}{8}$ " stud	95
17341	Insulated Bolt, $\frac{1}{8}$ " stud for Automatic Ear, Cat. No. 17338	95

SUSPENSIONS—FORM G

STRAIGHT LINE



Straight Line Suspension

Overall length across arms 6 in.; height above ear seat $3\frac{1}{8}$ in.; arm yokes accommodate $\frac{1}{8}$ in. span wire. All metal parts including studs have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
25976	Straight Line Suspension, $\frac{1}{8}$ " stud	245
66019	Straight Line Suspension, $\frac{1}{4}$ " stud	250
25977	Body	120
25978	Cap	35

SINGLE CURVE



Single Curve Suspension

Length from center line of stud to center of pull off eye 4 in.; height above ear seat $3\frac{1}{8}$ in.; diameter of pull off eye $\frac{1}{8}$ in.; thickness of pull off arm at eye $\frac{1}{4}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
25981	Single Curve Suspension, $\frac{1}{8}$ " stud	270
66022	Single Curve Suspension, $\frac{1}{4}$ " stud	275
25982	Body	145
25978	Cap	35

SUSPENSIONS—FORM G

DOUBLE CURVE



Double Curve Suspension

Length between centers of pull off eyes 8 in.; height above ear seat $3\frac{1}{8}$ in.; diameter of pull off eyes $\frac{1}{8}$ in.; thickness of pull off arm at eye $\frac{1}{2}$ in. All metal parts including stud have standard sherardized finish

Cat. No.	Description	Approx. Weight per 100
25984	Double Curve Suspension, $\frac{1}{8}$ " stud	310
66025	Double Curve Suspension, $\frac{1}{4}$ " stud	315
25985	Body	185
25978	Cap	35

CEILING



Ceiling Suspension

Height above ear seat $3\frac{1}{8}$ in.; diameter of screw holes $\frac{1}{8}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
25998	Ceiling Suspension, $\frac{1}{8}$ " stud	225
66034	Ceiling Suspension, $\frac{1}{4}$ " stud	230
25991	Body	75
25999	Cap	60

SUSPENSIONS—FORM G

SOCKET CEILING



Socket Ceiling Suspension

Height above ear seat $3\frac{7}{16}$ in.; width of screw slots $\frac{9}{16}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
38690	Socket Ceiling Suspension, $\frac{5}{8}$ " stud	170
68399	Socket Ceiling Suspension, $\frac{3}{4}$ " stud	175
38691	Body	80

BRACKET



Bracket Suspension

For suspensions for 2 in. pipe the height from ear seat to center of bracket arm clamp is $6\frac{1}{2}$ in.; for $1\frac{1}{2}$ in. pipe the height is $6\frac{1}{4}$ in. All metal parts including stud have standard sherardized finish.

Cat. No.	Description	Approx. Weight per 100
25989	Bracket Suspension, $\frac{5}{8}$ " stud for 2" pipe	480
66028	Bracket Suspension, $\frac{3}{4}$ " stud for 2" pipe	485
25990	Bracket Suspension, $\frac{5}{8}$ " stud for $1\frac{1}{2}$ " pipe	460
66030	Bracket Suspension, $\frac{3}{4}$ " stud for $1\frac{1}{2}$ " pipe	465
25991	Body	75
25995	Cap	40
25996	Clamp for 2" pipe	275
25997	Clamp for $1\frac{1}{2}$ " pipe	255

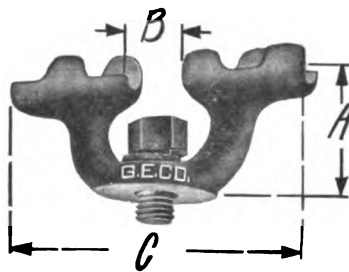
SUSPENSIONS—FORM T**FEEDER TAP**

The Feeder Tap Suspensions will fit any standard ear, except the automatic ear, Cat. No. 17338, and are used in place of the insulated suspensions, a tap from the feeder wire being substituted for the regular span wire. The bodies of these suspensions are composition with the lugs tinned for soldering to the span wire.

**Straight Line Suspension**

Overall length 6 in.; yokes accommodate $\frac{3}{8}$ in. span wire.

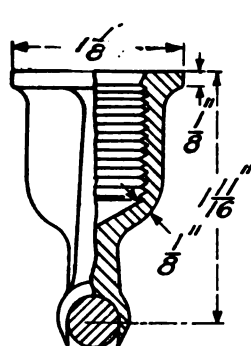
Cat. No.	Description	Approx. Weight per 100
11294	Straight Line Feeder Suspension, $\frac{5}{8}$ " stud comp.	85
11296	Straight Line Feeder Suspension, $\frac{3}{4}$ " stud comp.	90

**Feeder Clamp Suspension**

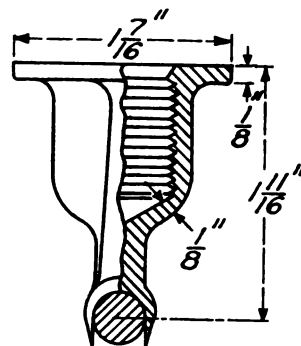
Cat. No.	Description	A	B	C	Approx. Weight per 100
16380	Feeder Clamp Suspension, $\frac{5}{8}$ " stud comp. for 1/0 feeder wire	$1\frac{1}{8}$ "	$1\frac{1}{8}$ "	$5\frac{1}{2}$ "	90
48807	Feeder Clamp Suspension, $\frac{3}{4}$ " stud comp. for 1/0 feeder wire	$1\frac{1}{8}$ "	$1\frac{1}{8}$ "	$5\frac{1}{2}$ "	95
61567	Feeder Clamp Suspension, $\frac{5}{8}$ " stud comp. for 4/0 feeder wire	$2\frac{3}{4}$ "	$1\frac{3}{4}$ "	$5\frac{1}{2}$ "	225
48808	Feeder Clamp Suspension, $\frac{3}{4}$ " stud comp. for 4/0 feeder wire	$2\frac{3}{4}$ "	$1\frac{3}{4}$ "	$5\frac{1}{2}$ "	230

EARS FOR ROUND WIRE

SOLDERED



Form H



Form H2

Soldered Ears for round wire are furnished in two Forms—the "H" and the "H2" which differ only in the diameter of the hub flange. The Form H with a $1\frac{1}{8}$ in. flange is particularly suitable for use with suspensions of the insulated bolt type, Form G. The Form H2 ears have a $1\frac{7}{16}$ in. hub flange and are especially suitable for suspensions presenting a large bearing surface at the base of their studs, such as the Forms H, S and D.

These ears have a groove depth equal to the diameter of the wire so that when the lips are peened down and soldered the bottom of the wire is exposed, allowing unobstructed passage of the trolley wheel.

In the design of these ears all angles are filled with generous fillets, and in their manufacture extreme care is exercised to maintain accurate dimensions of the milled grooves and of the lips which are tapered to a knife edge.

Grooves are milled to exact dimensions and, unless specially ordered, are tinned for soldering.

9 IN. PLAIN



Cat. No.	Description	Approx. Weight per 100
16034	Form H, for No. 0 wire, $\frac{1}{8}$ " tap	54
15157	Form H, for No. 00 wire, $\frac{1}{8}$ " tap	62
31666	Form H2, for No. 0 wire, $\frac{1}{8}$ " tap	57
31668	Form H2, for No. 00 wire, $\frac{1}{8}$ " tap	68

12 IN. PLAIN



32562	Form H, for No. 0 wire, $\frac{1}{8}$ " tap	63
32564	Form H, for No. 00 wire, $\frac{1}{8}$ " tap	72
32563	Form H2, for No. 0 wire, $\frac{1}{8}$ " tap	66
32565	Form H2, for No. 00 wire, $\frac{1}{8}$ " tap	85

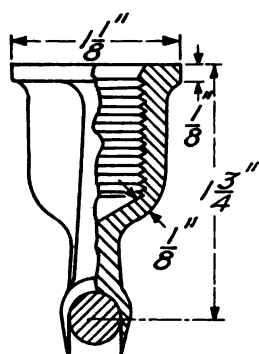
EARS FOR ROUND WIRE

SOLDERED

15 IN. PLAIN



Cat. No.	Description	Approx. Weight per 100
16394	Form H, for No. 0 wire, $\frac{1}{8}$ " tap	82
15022	Form H, for No. 00 wire, $\frac{1}{8}$ " tap	94
31665	Form H2, for No. 0 wire, $\frac{1}{8}$ " tap	88
31667	Form H2, for No. 00 wire, $\frac{1}{8}$ " tap	104
34111	Form H2, for No. 000 wire, $\frac{1}{8}$ " tap	122
26151	Form H2, for No. 000 wire, $\frac{1}{8}$ " tap	122
34112	Form H2, for No. 0000 wire, $\frac{1}{8}$ " tap	128
19492	Form H2, for No. 0000 wire, $\frac{1}{8}$ " tap	128



Form J

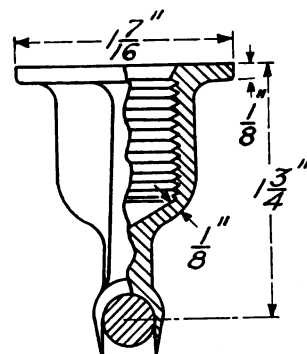
CLINCH

Clinch Ears for round wire are furnished in two forms,—the "J" and the "J2" which differ only in the diameter of the hub flange. The Form J, with a $1\frac{1}{8}$ in. flange is particularly suitable for use with suspensions of the insulated bolt type, Form G. The Form J2 ears have a $1\frac{7}{16}$ in. hub flange and are especially suitable for suspensions presenting a large bearing surface at the base of their studs, such as the Forms H, S and D.

The Clinch Ears have an extra deep groove so that the lips approximately meet beneath the wire and are generally used without solder.

In the design of these ears all angles are filled with generous fillets, and in their manufacture extreme care is exercised to maintain accurate dimensions of the milled grooves and of the lips, which are tapered to a knife edge.

Grooves are milled to exact dimensions and unless specially ordered are furnished untinned.



Form J2

CLINCH

9 IN. PLAIN



Cat. No.	Description	Approx. Weight per 100
32574	Form J, for No. 0 wire, $\frac{1}{8}$ " tap	57
32576	Form J, for No. 00 wire, $\frac{1}{8}$ " tap	63
32575	Form J2, for No. 0 wire, $\frac{1}{8}$ " tap	69
32577	Form J2, for No. 00 wire, $\frac{1}{8}$ " tap	74

EARS FOR ROUND WIRE**CLINCH****12 IN. PLAIN**

Cat. No	Description	Approx. Weight per 100
32570	Form J, for No. 0 wire, $\frac{1}{8}$ " tap	72
32572	Form J, for No. 00 wire, $\frac{1}{8}$ " tap	82
32571	Form J2, for No. 0 wire, $\frac{1}{8}$ " tap	75
32573	Form J2, for No. 00 wire, $\frac{1}{8}$ " tap	85

15 IN. PLAIN

19424	Form J, for No. 0 wire, $\frac{1}{8}$ " tap	85
19425	Form J, for No. 00 wire, $\frac{1}{8}$ " tap	94
32568	Form J2, for No. 0 wire, $\frac{1}{8}$ " tap	88
32569	Form J2, for No. 00 wire, $\frac{1}{8}$ " tap	97
34113	Form J2, for No. 000 wire, $\frac{1}{8}$ " tap	124
32566	Form J2, for No. 0000 wire, $\frac{1}{8}$ " tap	124
34114	Form J2, for No. 0000 wire, $\frac{1}{8}$ " tap	140
32567	Form J2, for No. 0000 wire, $\frac{1}{8}$ " tap	140

SOLDERED

All feeder, strain and splicing ears for use on round wire are of the deep groove form as denoted by the letter J. The 0 and 00 sizes have hub flanges $1\frac{1}{8}$ in. in diameter and the 000 and 0000 sizes have $1\frac{7}{8}$ in. flanges, the size of the flange being indicated by the absence or presence of the numerical exponent (2) after the form letter.

All these ears are designed for soldering and unless especially ordered are furnished with tinned lips.

15 IN. FEEDER

Cat. No.	Description	Approx. Weight per 100
15120	Form J, for No. 0 wire, $\frac{5}{8}$ " tap	95
15121	Form J, for No. 00 wire, $\frac{5}{8}$ " tap	100
34115	Form J2, for No. 000 wire, $\frac{5}{8}$ " tap	145
26152	Form J2, for No. 000 wire, $\frac{3}{4}$ " tap	145
34116	Form J2, for No. 0000 wire, $\frac{5}{8}$ " tap	155
26153	Form J2, for No. 0000 wire, $\frac{3}{4}$ " tap	155
39896	Set screw for above feeder ears, 14-24, $\frac{1}{2}$ " long, square head	

The feeder lug of the 0 and 00 ears is drilled to take 00 B. & S. solid wire. The 000 and 0000 ears take wire up to and including 0000 B. & S.

EARS FOR ROUND WIRE**SOLDERED****15 IN. STRAIN**

Cat. No.	Description	Approx. Weight per 100
68446	Form J, for No. 0 wire, 1/2" tap	100
60348	Form J, for No. 00 wire, 1/2" tap	110
60349	Form J2, for No. 000 wire, 1/2" tap	150
60350	Form J2, for No. 0000 wire, 1/2" tap	190

19 IN. STRAIN

15140	Form J, for No. 0 wire, 1/2" tap	130
15147	Form J, for No. 00 wire, 1/2" tap	145
34117	Form J2, for No. 000 wire, 1/2" tap	205
26156	Form J2, for No. 000 wire, 1/2" tap	205
34118	Form J2, for No. 0000 wire, 1/2" tap	250
26157	Form J2, for No. 0000 wire, 1/2" tap	250

SINGLE END STRAIN

30459	8", for No. 0 wire	40
30460	8", for No. 00 wire	50
34121	9", for No. 000 wire	60
34122	9", for No. 0000 wire	70

EARS FOR ROUND WIRE**SOLDERED****13 1/4 IN. DOUBLE BOSS STRAIN FOR USE WITH STRAIN PLATES**

Cat. No.	Description	Approx. Weight per 100
88955	Form J2, for No. 0 wire, 1/4" tap	130
88899	Form J2, for No. 00 wire, 1/4" tap	150
88898	Form J2, for No. 000 wire, 1/4" tap	200
59206	Form J2, for No. 000 wire, 1/4" tap	200
88897	Form J2, for No. 0000 wire, 1/4" tap	245
59205	Form J2, for No. 0000 wire, 1/4" tap	245

15 IN. SPLICING

15138	Form J, for No. 0 wire, 1/4" tap	125
12900	Form J, for No. 00 wire, 1/4" tap	130
34119	Form J2, for No. 000 wire, 1/4" tap	210
26154	Form J2, for No. 000 wire, 1/4" tap	210
34120	Form J2, for No. 0000 wire, 1/4" tap	250
26155	Form J2, for No. 0000 wire, 1/4" tap	250

19 IN. SPLICING EARS—MECHANICAL

Equipped with large clamping nuts for holding trolley wire. No solder needed.



41189	For Nos. 0 and 00 wire, 1/4" tap	400
41190	For Nos. 0 and 00 wire, 1/4" tap	400
30458	For Nos. 000 and 0000 wire, 1/4" tap	585
41186	For Nos. 000 and 0000 wire, 1/4" tap	585

EARS FOR ROUND WIRE**SOLDERED CLINCH****16 1/2 IN. FLEXIBLE**

These ears have hinged hubs to afford flexibility when used with rigid suspensions such as the Form D Bracket, and the various Ceiling and Mining Suspensions.



Cat. No.	Description	Approx. Weight per 100
17302	For No. 0 wire, $\frac{3}{8}$ " tap	175
19484	For No. 00 wire, $\frac{3}{8}$ " tap	195

SCREW CLAMP—FORM A

The ease of installation and removal of the Screw Clamp Ears for round wire make them increasingly useful, not only for temporary installations in mine work but also for more permanent work where comparatively slow speeds are encountered.

5 IN. PLAIN

Cat. No.	Description	Approx. Weight per 100
41047	For Nos. 0 and 00 wire, $\frac{3}{8}$ " tap, mal. iron, sherardized	70
41443	For Nos. 0 and 00 wire, $\frac{3}{8}$ " tap, comp.	80
66042	For Nos. 0 and 00 wire, $\frac{1}{2}$ " tap, mal. iron, sherardized	70
66044	For Nos. 0 and 00 wire, $\frac{1}{2}$ " tap, comp.	80
41049	For Nos. 000 and 0000 wire, $\frac{3}{8}$ " tap, mal. iron, sherardized	75
41444	For Nos. 000 and 0000 wire, $\frac{3}{8}$ " tap, comp.	85
66043	For Nos. 000 and 0000 wire, $\frac{1}{2}$ " tap, mal. iron, sherardized	75
66045	For Nos. 000 and 0000 wire, $\frac{1}{2}$ " tap, comp.	85

EARS FOR ROUND WIRE

FORM B CLAMPING EAR

This ear is provided with a thin metal sheath surrounding the wire.



Overall length 8 in.; height from center of trolley wire to top of hub $1\frac{1}{8}$ in.

Cat. No.	Description	Approx. Weight per 100
16379	Clamping Ear, Form B, $\frac{3}{8}$ " tap, for Nos. 0 and 00 wires, comp.	85
15901	Clamping Sheath, for Cat. No. 16379, copper	15
15902	Clamping Block, for Cat. No. 16379, mal. iron, sherardized	12
15903	Clamping Screw, for Cat. No. 16379, steel, sherardized	6

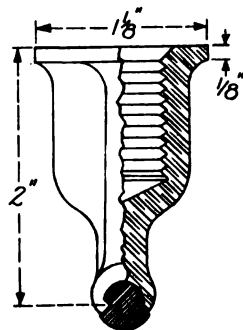
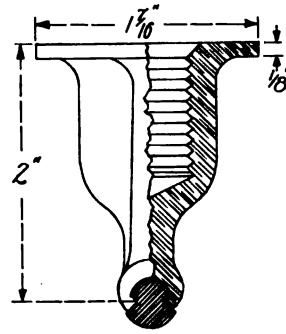
6 IN. AUTOMATIC EAR

The Automatic Ear is clamped on the wire by the spreading action of a special pointed stud in the suspension, for which the special insulated bolt, Cat. No. 17341, is furnished with Form G suspensions.

This ear is often very useful for temporary work, and, together with the adapter, can be used with standard suspensions.



Cat. No.	Description	Approx. Weight per 100
17338	6" Automatic Ear, for Nos. 0 and 00 wires, $\frac{3}{8}$ " tap, mal. iron, sherardized	125
17400	Adapter for No. 17338, $\frac{3}{8}$ " tap and stud, comp.	50

EARS FOR GROOVED WIRE**SOLDERED CLINCH****Form P****Form P2**

Clinch Ears for grooved wire are designed to be sprung on the wire by hand and the sides crimped together, making a snug fit. They are then usually soldered. The 00 ears are furnished with the hub flange either $1\frac{1}{8}$ in. or $1\frac{7}{16}$ in. in diameter; the difference being designated by the absence or presence of a numerical exponent after the form letter. Special attention is called to the fact that the grooves are formed to give an exact fit both at the groove bottom and the lips. The ears are furnished with lips tinned for soldering.

9 IN. PLAIN

Cat. No.	Description	Approx. Weight per 100
39876	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	80
39879	Form P2, for No. 00 wire, $\frac{3}{8}$ " tap	85
40941	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	100
40942	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	100
40937	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	120
40938	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	120

12 IN. PLAIN

39877	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	94
39880	Form P2, for No. 00 wire, $\frac{3}{8}$ " tap	100
40943	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	129
40944	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	129
40939	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	140
40940	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	140

EARS FOR GROOVED WIRE**SOLDERED CLINCH****15 IN. PLAIN**

Cat. No.	Description	Approx. Weight per 100
39878	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	108
39881	Form P2, for No. 00 wire, $\frac{3}{8}$ " tap	125
39882	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	150
39883	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	150
39884	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	170
39885	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	170

15 IN. FEEDER EARS

39891	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	140
39892	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	185
39893	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	180
39894	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	200
39895	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	200
39896	Set Screw for feeder ears, 14-24, $\frac{1}{2}$ ", square head	

The feeder boss on all 1/0 and 2/0 ears is drilled to take wire 2/0 and smaller. The 3/0 and 4/0 ears take feeder wires up to 4/0.

15 IN. STRAIN

60351	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	130
60352	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	190

19 IN. STRAIN

39886	Form P, for No. 00 wire, $\frac{3}{8}$ " tap	170
39887	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	238
39888	Form P2, for No. 000 wire, $\frac{3}{8}$ " tap	240
39889	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	290
39890	Form P2, for No. 0000 wire, $\frac{3}{8}$ " tap	290

EARS FOR GROOVED WIRE**SOLDERED CLINCH****SINGLE END STRAIN**

Cat. No.	Description	Approx. Weight per 100
68442	8" Half Strain Ear for No. 00 wire	60
68444	9" Half Strain Ear for No. 000 wire	75
68445	9" Half Strain Ear for No. 0000 wire	90

13 1/4 IN. DOUBLE BOSS STRAIN EARS**FOR USE WITH STRAIN PLATES**

88896	Form P2, for No. 00 wire, $\frac{1}{4}$ " tap	170
88894	Form P2, for No. 000 wire, $\frac{1}{4}$ " tap	225
59203	Form P2, for No. 000 wire, $\frac{1}{4}$ " tap	225
88895	Form P2, for No. 0000 wire, $\frac{1}{4}$ " tap	270
59204	Form P2, for No. 0000 wire, $\frac{1}{4}$ " tap	270

SPLICING EARS—SOLDERED

Designed for soldering in same manner as soldered splicing sleeves.



19436	19 $\frac{1}{4}$ " Splicing Ear for No. 00 wire, $\frac{1}{4}$ " tap	225
21487	19 $\frac{1}{4}$ " Splicing Ear for No. 00 wire, $\frac{1}{4}$ " tap	225
19437	21 $\frac{1}{4}$ " Splicing Ear for No. 000 wire, $\frac{1}{4}$ " tap	250
21488	21 $\frac{1}{4}$ " Splicing Ear for No. 000 wire, $\frac{1}{4}$ " tap	250
19438	23 $\frac{1}{4}$ " Splicing Ear for No. 0000 wire, $\frac{1}{4}$ " tap	285
21454	23 $\frac{1}{4}$ " Splicing Ear for No. 0000 wire, $\frac{1}{4}$ " tap	285

EARS FOR GROOVED WIRE

19 IN. SPLICING EARS—MECHANICAL



Cat. No.	Description	Approx. Weight per 100
41187	For Nos. 00 and 000 wire, $\frac{5}{8}$ " tap	400
41188	For Nos. 00 and 000 wire, $\frac{3}{4}$ " tap	400
30458	For No. 0000 wire, $\frac{5}{8}$ " tap	585
41186	For No. 0000 wire, $\frac{3}{4}$ " tap	585

SCREW CLAMP—FORM A

The form of the grooved trolley wire permits the use of a clamping ear which holds the wire with perfect security, and at the same time offers no obstruction to the passage of the trolley wheel.



Diagram Showing How
The Clamping Ear Holds
Grooved Trolley Wire

Diameter flange $1\frac{1}{8}$ in.; Thickness $\frac{1}{8}$ in.; Height 2 in.

The lips of the ears are so shaped as to give a four-point bearing in the grooves which prevents any tendency of the wire to roll out of the ear as a result of torsional or transverse stress.

The 5 in. and 7 in. Plain Ears are listed in both malleable iron and composition.

The Feeder and Strain Ears are composition with lips tinned for soldering to the wire.

All Screw Clamp Ears for grooved wires are interchangeable on Nos. 00, 000 and 0000 wire. They have $1\frac{1}{8}$ in. hub flanges and have $\frac{5}{8}$ -18 screws.

5 IN. PLAIN



Cat. No.	Description	Approx. Weight per 100
37804	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, mal. iron, sherardized	66
27627	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, comp.	75
59564	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, mal. iron, sherardized	66
30310	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, comp.	75

EARS FOR GROOVED WIRE

SCREW CLAMP EARS—FORM A

7 IN. PLAIN

The 7 in. Plain Ears, being designed especially for use with Nos. 000 and 0000 grooved wires, are extra heavy throughout.



Cat. No.	Description	Approx. Weight per 100
37805	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, mal. iron, sherardized	88
34124	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, comp.	100
37806	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, mal. iron, sherardized	88
27628	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, comp.	100

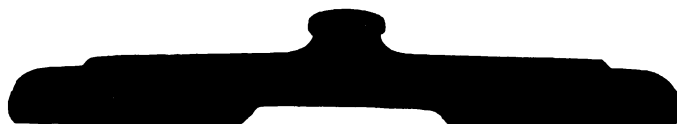
10 IN. CURVE

The Curve Ears may also be advantageously employed in straight line construction, especially with Nos. 000 and 0000 wires.



37808	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, mal. iron, sherardized	125
37685	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, mal. iron, sherardized	125

14 IN. CURVE



59568	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, mal. iron, sherardized	185
43716	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, mal. iron, sherardized	185

7 IN. FEEDER—WITH SUSPENSION BOSS



59565	For Nos. 00, 000 and 0000 wires, $\frac{5}{8}$ " tap, comp.	115
59566	For Nos. 00, 000 and 0000 wires, $\frac{3}{4}$ " tap, comp.	115

These feeder ears will accommodate feeder wire up to and including 4/0.

EARS FOR GROOVED WIRE**SCREW CLAMP EARS—FORM A****7 IN. FEEDER—WITHOUT SUSPENSION BOSS**

Cat. No.	Description	Approx. Weight per 100
48455	For Nos. 00, 000 and 0000 wires, comp.	100

This ear will accommodate feeder wire up to and including 4/0.

12 IN. STRAIN

34127	For Nos. 00, 000 and 0000 wires, $\frac{1}{4}$ " tap, comp.	165
21485	For Nos. 00, 000 and 0000 wires, $\frac{1}{2}$ " tap, comp.	165

12 IN. STRAIN—EXTRA HEAVY

59567	For Nos. 00, 000 and 0000 wires, $\frac{1}{2}$ " tap, comp.	200
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7 IN. HALF STRAIN

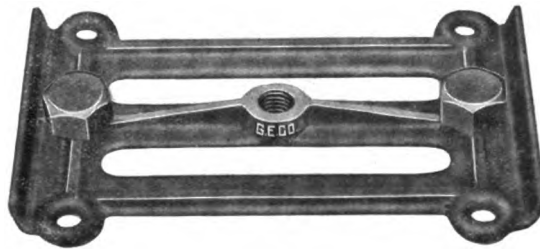
61232	For Nos. 00, 000 and 0000 wires, comp.	90
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STRAIN PLATES



Strain Plate with Double Boss Ear

The Strain Plate consists of a malleable iron casting designed for support at the center by any standard straight line hanger, the center hole being tapped for either $\frac{3}{8}$ in. or $\frac{1}{2}$ in. stud. $\frac{1}{2}$ in. holes are provided at each corner of the plate for attachment of guy wires. The double boss ears listed on pages 46 and 51 are generally used with the strain plate, though the use of two screw clamp ears either 5 in. or 7 in. long, is sometimes preferred.



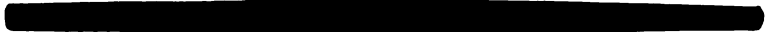
Overall length 10 in.; length between centers of pull off eyes $7\frac{1}{4}$ in.; length between centers of stud bolts $7\frac{1}{4}$ in.; overall width $6\frac{1}{4}$ in.; width between centers of pull off eyes $5\frac{1}{4}$ in. Standard sherardized finish throughout.

Cat. No.	Description	Approx. Weight per 100
62537	Strain Plate only, $\frac{3}{8}$ " tap, $\frac{3}{8}$ " studs	300
62536	Strain Plate only, $\frac{1}{2}$ " tap, $\frac{1}{2}$ " studs	310

SOLDERED SPLICING SLEEVES

In order to secure the greatest possible strength, Soldered Splicing Sleeves are made from hard drawn seamless tubing, so annealed as to relieve all internal strains in the metal and avoid all danger of weather cracks to which hard drawn brass is liable under exposure to the weather and extreme temperature changes. The sleeves are accurately tapered to insure smooth transition of the trolley wheel and resist the wear encountered in severe service. Since the weakest point of any sleeve must be at the slot, especial precautions are taken in forming it, and no more of the metal is cut away than is necessary to permit rapid installation on the trolley wire. The sleeves are tinned for soldering.

BRASS SLEEVES (STANDARD)



Cat. No.	Description	Approx. Weight per 100
64431	For No. 0 round wire, 10" x $\frac{3}{8}$ "	50
64432	For No. 0 round wire, 15" x $\frac{3}{8}$ "	75
64433	For No. 00 round or grooved wire, 10" x $\frac{3}{8}$ "	55
64434	For No. 00 round or grooved wire, 16" x $\frac{3}{8}$ "	75
64435	For No. 000 round or grooved wire, 11" x $\frac{3}{8}$ "	90
64436	For No. 000 round or grooved wire, 18" x $\frac{3}{8}$ "	130
64437	For No. 0000 round or grooved wire, 12" x $\frac{7}{8}$ "	150
64438	For No. 0000 round or grooved wire, 20" x $\frac{7}{8}$ "	210

PURE COPPER SLEEVES

88641	For No. 0 round wire, 15" x $\frac{3}{8}$ "	80
88651	For No. 00 round or grooved wire, 16" x $\frac{3}{8}$ "	80
88672	For No. 000 round or grooved wire, 18" x $\frac{3}{8}$ "	130
88785	For No. 0000 round or grooved wire, 20" x $\frac{3}{8}$ "	200

MECHANICAL SPLICING SLEEVES

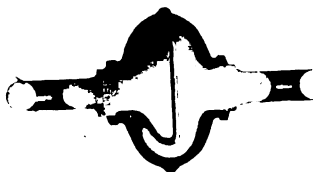
For use without solder. Made of brass with tempered steel wedges.



Cat. No.	Description	Approx. Weight per 100
64441	For No. 0 round wire, 10" long	75
64442	For No. 00 round or grooved wire, 11" long	90
64443	For No. 000 round or grooved wire, 11" long	115
64444	For No. 0000 round or grooved wire, 12" long	125

STRAIN INSULATORS

GIANT



Recent radical improvements in design give the Giant Strain Insulator a largely increased mechanical strength and a dielectric strength to care for the potentials encountered in direct suspension work. The insulation under stress is exclusively sheet mica (under compression) and the limit of its mechanical strength is the rupturing limit of the metal parts without regard to temperature or other service conditions. The insulators are made in two sizes, having 2 in. and 2½ in. diameters, and equipped with standard and large eyes and standard and large clevises in any combination. All metal parts are sherardized.

STRENGTH

MECHANICAL			ELECTRICAL		
	2"	2½"		2"	2½"
Test load	2500 lbs.	4000 lbs.	Test voltage	5000 v.	5000 v.
Average breaking load	5000 lbs.	8000 lbs.	Average breakdown voltage	12000 v.	15000 v.

DIMENSIONS

DIMENSIONS OF EYES			DIMENSIONS OF CLEVISES		
	Inside Diam.	Outside Diam.		Spread	Diam. of Through Bolt
Standard eye for 2" ins.	9/16"	1 1/16"	Standard clevis for 2" ins.	9/16"	3/8"
Large eye for 2" ins.	1 1/16"	1 1/8"	Standard clevis for 2 5/8" ins.	5/8"	1/2"
Standard eye for 2 5/8" ins.	9/16"	1 1/16"	Large clevis for 2 5/8" ins.	3/4"	5/8"
Large eye for 2 5/8" ins.	1 1/8"	1 1/4"			

2 IN. GIANT



Cat. No. 64425



Cat. No. 64417

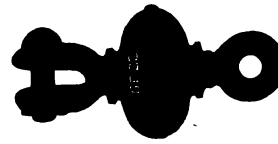
Cat. No.	Description	Distance Between Centers of Eyes or Clevis Bolt Holes	Approx. Weight per 100
64417	With standard eye and clevis	4 3/4"	105
64418	With 2 standard clevises	4 1/2"	115
64419	With large eye and standard clevis	4 3/4"	110
64425	With 2 standard eyes	3 3/4"	87
64427	With large eye and standard eye	3 1/2"	92
64428	With 2 large eyes	3 1/2"	95

STRAIN INSULATORS

2 5/8 IN. GIANT



Cat. No. 64426



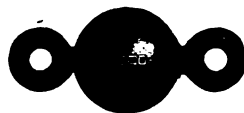
Cat. No. 64420

Cat. No.	Description	Distance Between Centers of Eyes or Clevis Bolt Holes	Approx. Weight per 100
64420	With standard eye and clevis	4 7/16"	165
64421	With standard eye and large clevis	4 7/16"	173
64422	With large eye and large clevis	4 1/2"	182
64423	With 2 standard clevises	4 1/2"	180
64424	With 2 large clevises	4 1/2"	200
64426	With 2 standard eyes	4"	155
64429	With large eye and standard eye	4 1/16"	165
64430	With 2 large eyes	4 1/8"	200

SPHERICAL

The Spherical Strain Insulators are made in two sizes having diameters 2 1/4 in. and 2 3/4 in. They are designed especially for use in span and guy wires in relatively light construction. The smaller size is suitable for a working load of 1000 lbs.; the average tensile strength is 3000 lbs. The 2 3/4 in. size has an average tensile strength of 5000 lbs., and is suitable for a working load up to 2000 lbs. Both sizes are subjected to a potential test of 5000 volts.

DIMENSIONS OF EYES			DIMENSIONS OF CLEVISES		
	Inside Diam.	Outside Diam.		Spread	Diam. of Through Bolt
Eye for 2 1/4" insulator	1 7/8"	1 1/4"	Clevis for 2 1/4" insulator	1 7/8"	1"
Eye for 2 3/4" insulator	1 1/2"	1 1/4"	Clevis for 2 3/4" insulator	1 3/4"	1 1/2"



Cat. No. 27378



Cat. No. 27380

Cat. No.	Description	Distance Between Centers of Eyes or Clevis Bolt Holes	Approx. Weight per 100
27378	2 1/4" insulator, with mal. iron eyes, sherardized	3 9/16"	85
16399	2 1/4" insulator, with comp. eyes	3 9/16"	85
27380	2 3/4" insulator, with mal. iron eyes, sherardized	4"	125
17221	2 3/4" insulator, comp. eyes	4"	125



Cat. No. 27379

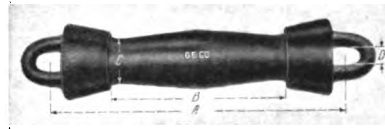


Cat. No. 27381

27379	2 1/4" insulator, with mal. iron eye and clevis, sherardized	4"	130
16400	2 1/4" insulator, with comp. eye and clevis	4"	130
27381	2 3/4" insulator, with mal. iron eye and clevis, sherardized	4 1/16"	155
17222	2 3/4" insulator, with comp. eye and clevis	4 1/16"	155

STRAIN INSULATORS**WOOD****WITH TWO EYES**

The Wood Strain Insulators are made from selected hickory, treated by a special oil impregnating process which permanently excludes moisture. All end caps have standard sherardized finish.

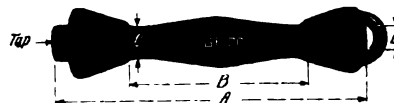


Cat. No.	A	B	C	D	Test Load	Average Breaking Load	Approx. Weight per 100
16727	9 $\frac{1}{4}$ "	5"	1"	$\frac{1}{16}$ "	3500 lbs.	7000 lbs.	140
37488	9 $\frac{1}{4}$ "	5"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	5000 lbs.	10000 lbs.	175
61563	12"	5"	1 $\frac{1}{4}$ "	$\frac{1}{4}$ "	7500 lbs.	15000 lbs.	440
37489	20"	15"	1"	$\frac{1}{16}$ "	3500 lbs.	7000 lbs.	180
36313	20"	15"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	5000 lbs.	10000 lbs.	235
48433	28 $\frac{1}{2}$ "	24"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	5000 lbs.	10000 lbs.	300

WITH EYE AND CLEVIS

Cat. No.	A	B	C	D	E	Test Load	Average Breaking Load	Approx. Weight per 100
43229	9 $\frac{1}{4}$ "	5"	1"	$\frac{1}{16}$ "	$\frac{1}{2}$ "	3500 lbs.	7000 lbs.	160
43230	9 $\frac{1}{4}$ "	5"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	$\frac{1}{2}$ "	5000 lbs.	10000 lbs.	185
43231	20 $\frac{1}{4}$ "	15"	1"	$\frac{1}{16}$ "	$\frac{1}{2}$ "	3500 lbs.	7000 lbs.	225
43232	20 $\frac{1}{4}$ "	15"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	$\frac{1}{2}$ "	5000 lbs.	10000 lbs.	295

Clevis has $\frac{1}{4}$ in. bolt hole and $\frac{1}{2}$ in. bolt.

WITH EYE AND TAPPED BOSS

Cat. No.	A	B	C	D	Tap	Test Load	Average Breaking Load	Approx. Weight per 100
17030	9 $\frac{1}{4}$ "	5"	1"	$\frac{1}{16}$ "	$\frac{5}{8}$ "-11	3500 lbs.	7000 lbs.	110
100126	9 $\frac{1}{4}$ "	5"	1 $\frac{1}{4}$ "	$\frac{1}{16}$ "	$\frac{5}{8}$ "-11	5000 lbs.	10000 lbs.	190

TURNBUCKLES

INSULATED TURNBUCKLE

Insulated turnbuckles are provided with drop forged steel eyebolts. In turnbuckles with malleable iron castings, the eyebolts are sherardized to prevent rusting and in the composition turnbuckles the eyebolt is heavily plated with copper. The casting is made in two halves which fit around the head of the insulated portion and are then riveted together, thus affording a resistance to tensile strain limited only by the ultimate breaking point of the solid metal. The swivel bearing is metal to metal and is designed so that there is no relative motion between the insulated portion and the adjoining head. The maximum draw-up for both sizes is 4 in.



Cat. No.	Description	Test Load	Average Breaking Load	Max. Length Between Eyes	Diameter of Eyes	Approx. Weight per 100
27382	$\frac{1}{2}$ " bolt, mal. iron, sherardized	4000 lbs.	8000 lbs.	11 $\frac{3}{4}$ "	$\frac{3}{4}$ "	325
17223	$\frac{1}{2}$ " bolt, comp.	2500 lbs.	5000 lbs.	11 $\frac{3}{4}$ "	$\frac{3}{4}$ "	350
40802	$\frac{3}{4}$ " bolt, mal. iron, sherardized	7000 lbs.	14000 lbs.	12"	1"	350
40803	$\frac{3}{4}$ " bolt, comp.	4500 lbs.	9000 lbs.	12"	1"	375

TURNBUCKLE WITH INSULATED EYE

This consists of a forged steel turnbuckle with one eye insulated with moulded compound, protected on the inside by a special steel ring having its edges beveled to prevent cutting the guy wire. These turnbuckles have standard sherardized finish.



Turnbuckle with Insulated Eye

Cat. No.	Description	Test Load	Average Breaking Load	Max. Take-up	Diam. Bolt	Max. Length Between Centers of Eyes	Approx. Weight per 100
27383	Forged turnbuckle, with ins. eye	3000 lbs.	6000 lbs.	6 $\frac{1}{2}$ "	$\frac{1}{2}$ "	18 $\frac{1}{2}$ "	275
100293	Forged turnbuckle, with ins. eye	4000 lbs.	8000 lbs.	6 $\frac{1}{2}$ "	$\frac{3}{8}$ "	18 $\frac{1}{2}$ "	325

TROLLEY FROGS

For different classes of service three sets of frogs, differing in the divergence angle of tongues and length of pan, are furnished.

For ordinary city service, with turnout radii not exceeding about 50 feet, the 20° frogs are suitable, but, with the longer radii introduced by suburban and interurban work, smaller divergence angles are necessary.

The following table gives the range of distance from track switch point to track frog with which each set of trolley frogs may be most satisfactorily used:

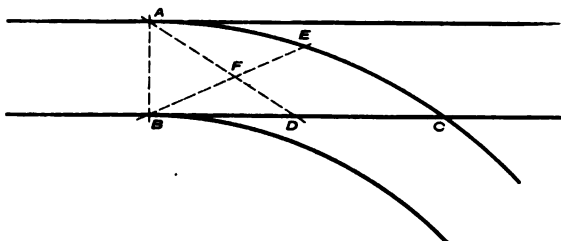
Frog Distance	Divergence Angle of Trolley Frog
Up to 22 feet	20°
From 20 to 30 feet	15°
Above 28 feet	8°

The minimum frog distance given in the table with which the 15° frogs may be used to best advantage corresponds to a turnout radius of 40 feet, but when suburban cars, using high speed trolley wheels, run over city tracks it is advisable to use 15° rather than 20° frogs throughout the city construction even where the minimum frog distance is less than 20 feet.

In order to insure smooth transition of the wheel between tongue and pan, the pans of all Form G frogs have, at each end, an inclined plane rising at a very acute angle from the horizontal, which receives the flange of the wheel at a point depending upon the depth of the wheel groove. The depth of tongues and rise of the inclined plane admit the use of a groove depth of from $\frac{3}{4}$ in. to $1\frac{1}{8}$ in.

All standard frogs are provided with four pull off rings, but similar frogs with two rings can be furnished if specially ordered.

The following diagram shows an excellent method of properly placing the frogs on the line, and while certain variables, such as super-elevation of the outer rail on the curve, length of wheel base, and projection of trolley pole rearward from center of car, will necessitate slight variation of setting, this location will be found so nearly correct that a very small alteration, which must be determined by experiment, will compensate for the variable conditions.



TO LOCATE TROLLEY FROG

From switch point, A, draw a line to center point, D, of frog distance BC, and from switch point B, draw a line to center point E, of arc AEC. The intersection of these two lines at F will be the proper location of the frog.

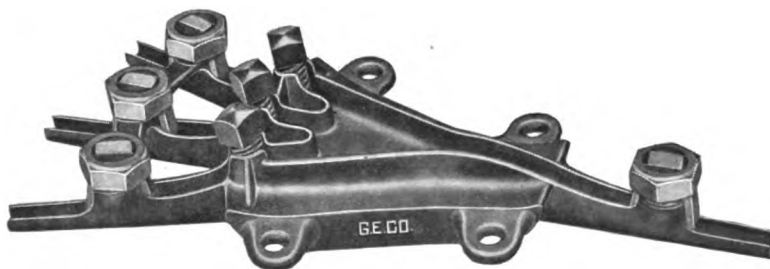
TROLLEY FROGS, FORM G

20 DEGREE FROGS

FOR ROUND OR GROOVED WIRES



20 Degree V Frog



20 Degree 3-Way Frog

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
29133	Right-hand frog, for No. 0 and 00 wires, comp.	17"	6½"	710
29134	Left-hand frog, for No. 0 and 00 wires, comp.	17"	6½"	710
29132	V frog, for No. 0 and 00 wires, comp.	17"	6½"	725
29135	3-way frog, for No. 0 and 00 wires, comp.	17"	7½"	1000
46645	Right-hand frog, for No. 000 and 0000 wires, comp.	17"	6½"	710
46646	Left-hand frog, for No. 000 and 0000 wires, comp.	17"	6½"	710
46644	V frog, for No. 000 and 0000 wires, comp.	17"	6½"	725
46647	3-way frog, for No. 000 and 0000 wires, comp.	17"	7½"	1000

All pull off eyes are ½ in. in diameter.

TROLLEY FROGS, FORM G**15 DEGREE FROGS****FOR ROUND OR GROOVED WIRES****15 Degree Left-hand Frog****15 Degree 3-Way Frog**

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100.
29130	Right-hand frog, for Nos. 00, 000 and 0000 wires, comp.	18"	5 $\frac{1}{16}$ "	875
29131	Left-hand frog, for Nos. 00, 000 and 0000 wires, comp.	18"	5 $\frac{1}{16}$ "	875
29129	V frog, for Nos. 00, 000 and 0000 wires, comp.	18"	5 $\frac{1}{16}$ "	890
37487	3-way frog, for Nos. 00, 000 and 0000 wires, comp.	18"	7 $\frac{1}{8}$ "	1150

All pull off eyes are $\frac{1}{4}$ in. in diameter.

Frogs similar to the above but for 1/0 wire will be furnished at the same price.

8 DEGREE FROGS**FOR ROUND OR GROOVED WIRES****8 Degree Right-hand Frog**

29127	Right-hand frog, for Nos. 00, 000 and 0000 wires, comp.	21 $\frac{1}{8}$ "	6"	1300
29128	Left-hand frog, for Nos. 00, 000 and 0000 wires, comp.	21 $\frac{1}{8}$ "	6"	1300
29126	V frog, for Nos. 00, 000 and 0000 wires, comp.	21 $\frac{1}{8}$ "	6"	1350

All pull off eyes are $\frac{1}{4}$ in. in diameter.

Frogs similar to the above but for 1/0 wire will be furnished at the same price.

TROLLEY FROGS, FORM G**DRAWBRIDGE FROG****Drawbridge Frog**

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
16395	Complete, $\frac{5}{8}$ " tap, for Nos. 00, 000 and 0000 wires, comp.	15"	7 $\frac{1}{8}$ "	875
15993	Without spring contact, comp.	15"	7 $\frac{1}{8}$ "	690

Frogs similar to the above but for 1/0 wire will be furnished at the same price.

TROLLEY FROGS, FORM G2**Frog with One Tongue in Position, Other Two Disconnected**

The Form G2 frogs are like the Form G, excepting in material and the arrangement of the end tongues. The body of the Form G2 is sherardized malleable iron and the renewable end tongues are composition. The tongue proper, which is peened over the trolley wire, and the shoe, which clamps the wire under pressure from the large clamping nut, are in one piece and may be removed and replaced without in any way disturbing the frog body.

**20 DEGREE FROGS
FOR ROUND OR GROOVED WIRES****20 Degree Left-hand Frog**

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
110745	Right-hand frog, for Nos. 0 and 00 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	710
60302	Right-hand frog, for Nos. 000 and 0000 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	710
110746	Left-hand frog, for Nos. 0 and 00 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	710
60301	Left-hand frog, for Nos. 000 and 0000 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	710
110747	V frog, for Nos. 0 and 00 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	725
60303	V frog, for Nos. 000 and 0000 wires, mall. iron, sherardized	17"	6 $\frac{1}{2}$ "	725
110748	3-way frog, for Nos. 0 and 00 wires, mall. iron, sherardized	17"	7 $\frac{1}{8}$ "	1000
60307	3-way frog, for Nos. 000 and 0000 wires, mall. iron, sherardized	17"	7 $\frac{1}{8}$ "	1000
110756	End tongue for all frogs for Nos. 0 and 00 wires, comp.			50
65856	End tongue for all frogs for Nos. 000 and 0000 wires, comp.			50

All pull off eyes $\frac{1}{2}$ in. in diameter.

TROLLEY FROGS, FORM G2**15 DEGREE FROGS****FOR ROUND OR GROOVED WIRES****15 Degree Left-hand Frog**

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
110749	Right-hand frog, for Nos. 0 and 00 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	875
60228	Right-hand frog, for Nos. 000 and 0000 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	875
110750	Left-hand frog, for Nos. 0 and 00 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	875
60226	Left-hand frog, for Nos. 000 and 0000 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	875
110751	V frog, for Nos. 0 and 00 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	890
60229	V frog, for Nos. 000 and 0000 wires, mall. iron sherardized	18"	5 $\frac{1}{8}$ "	890
110752	3-way frog, for Nos. 0 and 00 wires, mall. iron sherardized	18"	7 $\frac{1}{8}$ "	1150
60234	3-way frog, for Nos. 000 and 0000 wires, mall. iron sherardized	18"	7 $\frac{1}{8}$ "	1150
110756	End tongue for all frogs, for Nos. 0 and 00 wires, comp.			50
65856	End tongue for all frogs, for Nos. 000 and 0000 wires, comp.			50

All pull off eyes are $\frac{1}{2}$ in. in diameter.

8 DEGREE FROGS**FOR ROUND OR GROOVED WIRES****8 Degree Left-hand Frog**

110753	Right-hand frog, for Nos. 0 and 00 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1300
60131	Right-hand frog, for Nos. 000 and 0000 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1300
110754	Left-hand frog, for Nos. 0 and 00 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1300
60132	Left-hand frog, for Nos. 000 and 0000 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1300
110755	V frog, for Nos. 0 and 00 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1350
60133	V frog, for Nos. 000 and 0000 wires, mall. iron sherardized	21 $\frac{1}{8}$ "	6"	1350
110756	End tongue for all frogs, for Nos. 0 and 00 wires, comp.			50
65856	End tongue for all frogs, for Nos. 000 and 0000 wires, comp.			50

All pull off eyes are $\frac{1}{2}$ in. in diameter.

TROLLEY FROGS—SPECIAL

8 DEGREE HIGH SPEED FROGS

FOR ROUND OR GROOVED WIRES



8 Degree Right-hand Frog

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
58720	Right-hand frog, complete with guard plate and clamping ears for Nos. 00, 000 and 0000 comp.	23 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	1900
58721	Left-hand frog, complete with guard plate and clamping ears for Nos. 00, 000 and 0000 comp.	23 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	1900
58722	V frog, complete with guard plate and clamping ears for Nos. 00, 000 and 0000 comp.	23 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	1900

All pull off eyes are $\frac{1}{2}$ in. in diameter.

8 DEGREE FROGS

For line work where both wheel and sliding collectors are employed the following are offered.



8 Degree Right-hand Frog

49054	Right-hand frog, for Nos. 00, 000 and 0000 wires, comp.	22"	6 $\frac{1}{8}$ "	1375
59825	Left-hand frog, for Nos. 00, 000 and 0000 wires, comp.	22"	6 $\frac{1}{8}$ "	1375
59826	V frog, for Nos. 00, 000 and 0000 wires, comp.	22"	6 $\frac{1}{8}$ "	1375

All pull off eyes are $\frac{1}{2}$ in. in diameter.

15 DEGREE FROGS

Suitable for yard work where sliding collectors are used.



15 Degree Right-hand Frog

66673	Right-hand frog, for Nos. 00, 000 and 0000 wires, comp.	17 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	950
66674	Left-hand frog, for Nos. 00, 000 and 0000 wires, comp.	17 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	950
66675	V frog, for Nos. 00, 000 and 0000 wires, comp.	17 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	975

All pull off eyes are $\frac{1}{2}$ in. in diameter.

CROSSINGS, FORM G, UNINSULATED

The principle of the inclined plane to insure smooth transition of the trolley wheel between tongue and pan has been embodied in the design of all Form G Crossings, and the maximum speed at which the trolley will operate at crossing points has been greatly increased thereby. They will accommodate round or grooved wires of the sizes indicated in the tables.

RIGHT ANGLE CROSSING

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
11297	For Nos. 00, 000 and 0000 wires, comp.	15 $\frac{3}{8}$ "	15 $\frac{3}{8}$ "	910

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

ADJUSTABLE CROSSING

The Form G Adjustable Crossing can be set at any angle between 30 and 90 degrees.



Overall length of each runway 20 $\frac{3}{8}$ in.

Cat. No.	Description	Approx. Weight per 100
11298	For Nos. 00, 000 and 0000 wires, comp.	1075

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

CROSSINGS, FORM G, UNINSULATED**35 DEGREE CROSSING**

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
42413	Crossing for Nos. 00, 000 and 0000 wires, comp.	16"	5½"	865

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

15 DEGREE CROSSING

Cat. No.	Description	Overall Length	Overall Width	Approx. Weight per 100
19490	Crossing for Nos. 00, 000 and 0000 wires, comp.	21½"	5½"	1025

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

For use where both wheel and sliding collectors are employed, the following are offered.

RIGHT ANGLE CROSSING

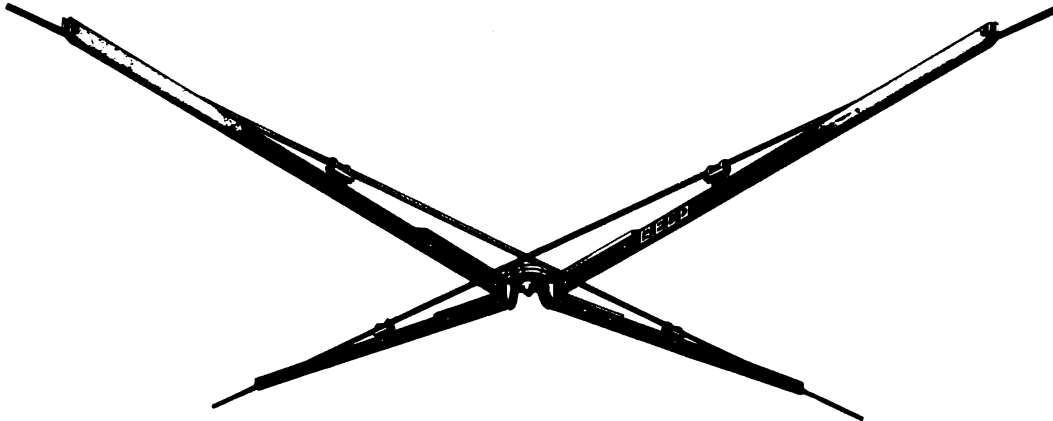
This crossing is similar to the right angle crossing for wheel collectors, Cat. No. 11297, excepting that in the pan is provided a double groove runway for wheels, and heavy extension flanges offer a smooth underrun for sliding collectors.



Cat. No.	Description	Approx. Weight per 100
64170	For Nos. 00, 000 and 0000 wires, comp.	1000

CROSSINGS, FORM G, UNINSULATED**ADJUSTABLE CROSSING**

The Adjustable Crossing is composed of light structural steel sections with sherardized finish, having a dip at the center point to provide clearance for the passage of the sliding collector.



Cat. No.	Description	Approx. Weight per 100
48835	Adjustable crossing for Nos. 00, 000 and 0000 wires	4000

CROSSINGS, FORM L, INSULATED

The Form L Insulated Crossing consists of a beam of selected second growth hickory thoroughly impregnated with preservative oils to exclude moisture, finished with black japan, and castings of standard composition metal with a replaceable white fiber runway. Attachment to the trolley wires is effected by mechanical clamps so that the crossing may be installed quickly without soldering and without cutting either wire.

The fiber runways as listed include fiber plates with screws. The crossings will accommodate round or grooved wires of the sizes indicated in the tables.

SINGLE TROLLEY
RIGHT ANGLE CROSSING



Overall length 35½ in.; overall width 18½ in.

Cat. No.	Description	Approx. Weight per 100
46184	Right angle crossing, for Nos. 00, 000 and 0000 wires	1750
100935	White fiber runway, for Cat. No. 46184	

Crossings similar to above, but for 1/0 wire will be furnished at the same price.

CROSSINGS, FORM L, INSULATED SINGLE TROLLEY ADJUSTABLE CROSSINGS

The Form L Adjustable Crossings can be set at any angle between 45 and 90 degrees.



Overall length 36 in.; maximum overall width 16½ in.

Cat. No.	Description	Approx. Weight per 100
19406	Adjustable crossing for Nos. 0 and 00 wires	1275
19407	White fiber runway for Cat. No. 19406	18



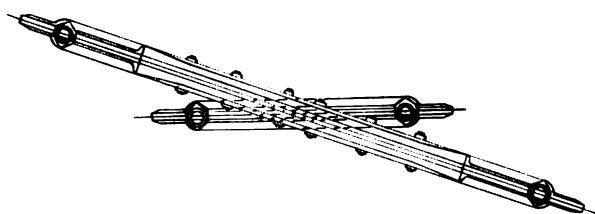
Overall length 35½ in.; maximum overall width 16½ in.

26150	Adjustable crossing, for Nos. 00, 000 and 0000 wires	1400
19407	White fiber runway for Cat. No. 26150	18

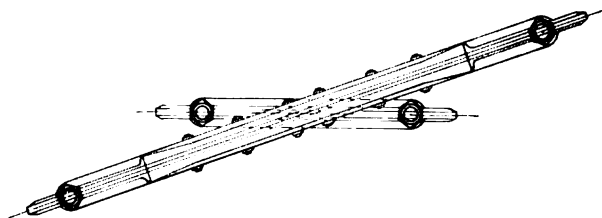
Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

ACUTE ANGLE

The Acute Angle Crossings can be furnished either right or left hand. The right hand crossing is considered standard and is generally applicable. However, under certain conditions such as the crossing of a 250 and 500 volt line, right and left crossings are not interchangeable. The left hand crossings are, therefore, listed and will be made up on order at the same prices as the corresponding right hand crossings.



Left-hand Crossing



Right-hand Crossing

CROSSINGS, FORM L, INSULATED**SINGLE TROLLEY****ACUTE ANGLE—RIGHT-HAND CROSSINGS**

Cat. No.	Description	OVERALL DIMENSIONS		Approx. Weight per 100
		Length	Width	
30615	35° Right-hand crossing, for Nos. 00, 000 and 0000 wires	39"	9½"	1725
30616	White fiber runway, for Cat. No. 30615			25
30613	27° Right-hand crossing, for Nos. 00, 000 and 0000 wires	39"	9½"	1700
30614	White fiber runway, for Cat. No. 30613			25
30611	20° Right-hand crossing, for Nos. 00, 000 and 0000 wires	46½"	6½"	1685
30612	White fiber runway, for Cat. No. 30611			25
30609	15° Right-hand crossing, for Nos. 00, 000 and 0000 wires	46½"	6½"	1685
30610	White fiber runway, for Cat. No. 30609			25
46181	8° Right-hand crossing, for Nos. 00, 000 and 0000 wires	56½"	5"	1675
100919	White fiber runway, for Cat. No. 46181			25

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

LEFT-HAND CROSSINGS

Cat. No.	Description	OVERALL DIMENSIONS		Approx. Weight per 100
		Length	Width	
100181	35° Left-hand crossing, for Nos. 00, 000 and 0000 wires	39"	9½"	1725
100924	White fiber runway, for Cat. No. 100181			25
100180	27° Left-hand crossing, for Nos. 00, 000 and 0000 wires	39"	9½"	1700
100923	White fiber runway, for Cat. No. 100180			25
64167	20° Left-hand crossing, for Nos. 00, 000 and 0000 wires	46½"	6½"	1685
100922	White fiber runway, for Cat. No. 64167			25
64166	15° Left-hand crossing, for Nos. 00, 000 and 0000 wires	46½"	6½"	1685
100921	White fiber runway, for Cat. No. 64166			25
100179	8° Left-hand crossing, for Nos. 00, 000 and 0000 wires	56½"	5"	1675
100120	White fiber runway, for Cat. No. 100179			25

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

DOUBLE TROLLEY

The Double Trolley Crossings consist primarily of an insulating beam and two cross tongues spaced suitably for use where the double trolley wires are 6½ inches between centers. Crossings with tongue spacing either greater or less than standard will be supplied for special conditions at prices corresponding to the standard.

Crossings consisting of two insulating beams and a single cross tongue or with two beams and two cross tongues (for the crossing of two double trolley lines) are built to order.

CROSSINGS, FORM L, INSULATED DOUBLE TROLLEY

RIGHT-ANGLE CROSSING



Overall length $43\frac{1}{2}$ in.; overall width $18\frac{1}{2}$ in.

Cat. No.	Description	Approx. Weight per 100
46185	Right-angle crossing, for Nos. 00, 000 and 0000 wires, $6\frac{1}{2}$ " between trolley centers	1925
100936	White fiber runway, for Cat. No. 46185	

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

ADJUSTABLE CROSSING

The Adjustable Double Crossing may be set at any angle between 45 and 90 degrees; when set at 45 degrees, the distance between wires is $4\frac{3}{4}$ inches, and at 90 degrees $6\frac{1}{2}$ inches.



Overall length $43\frac{1}{2}$ in.; maximum overall width $16\frac{1}{2}$ in.

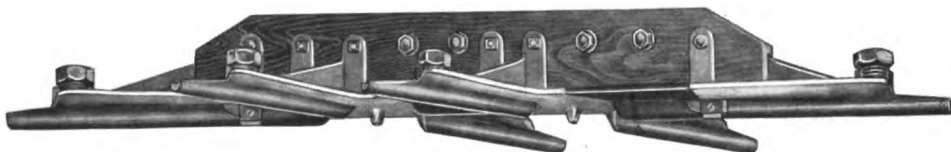
64634	Adjustable crossing, for Nos. 00, 000 and 0000 wires, $6\frac{1}{2}$ " between pivot points	2100
100917	White fiber runway, for Cat. No. 64634	

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

CROSSINGS, FORM L, INSULATED**DOUBLE TROLLEY****ACUTE ANGLE****RIGHT-HAND CROSSING**

Cat. No.	Description	OVERALL DIMENSIONS		Distance Between Trolley Centers	Approx. Weight per 100
		Length	Width		
64169	35° Right-hand crossing, for Nos. 00, 000 and 0000 wires	49½"	9½"	6½"	2300
100929	White fiber runway, for Cat. No. 64169				
100184	27° Right-hand crossing, for Nos. 00, 000 and 0000 wires	49½"	9½"	6½"	2400
100928	White fiber runway, for Cat. No. 100184				
100183	20° Right-hand crossing, for Nos. 00, 000 and 0000 wires	49½"	9½"	6½"	2500
100927	White fiber runway, for Cat. No. 100183				
62552	15° Right-hand crossing, for Nos. 00, 000 and 0000 wires	71½"	6½"	6½"	2600
100926	White fiber runway, for Cat. No. 62552				

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

LEFT-HAND CROSSING

100268	35° Left-hand crossing, for Nos. 00, 000 and 0000 wires	49½"	9½"	6½"	2300
100934	White fiber runway, for Cat. No. 100268				
100187	27° Left-hand crossing, for Nos. 00, 000 and 0000 wires	49½"	9½"	6½"	2400
100933	White fiber runway, for Cat. No. 100187				
100830	20° Left-hand crossing, for Nos. 00, 000 and 0000 wires	64"	6½"	6½"	2500
100932	White fiber runway, for Cat. No. 100830				
100186	15° Left-hand crossing, for Nos. 00, 000 and 0000 wires	64"	6½"	6½"	2600
100931	White fiber runway, for Cat. No. 100186				

Crossings similar to the above, but for 1/0 wire will be furnished at the same price.

SECTION INSULATORS, FORM L

The Form L Section Insulator consists of a beam of selected second growth hickory well seasoned and treated with preservative oils to exclude moisture, finished with black japan, and castings of the standard composition metal, with a replaceable runway of hickory. Attachment to the trolley wires is made by double mechanical clamps at each end. The wood runway in conjunction with the accurately aligned castings offers a straight under-run insuring a smooth passage for the trolley wheel. For 600 volt service the wood runway provides a 7 in. break in the trolley circuit—for 1200 volt service the break is 12 in.

The insulators will accommodate round or grooved wires of the sizes indicated in the tables.

600-1200 VOLTS



Overall length $31\frac{1}{2}$ in.

Cat. No.	Description	Overall Length	Approx. Weight per 100
19410	Section insulator, for Nos. 0 and 00 wires, 600 volts	$31\frac{1}{2}$ "	1010
19491	Section insulator, for Nos. 00, 000 and 0000 wires, 600 volts	$31\frac{1}{2}$ "	975
21456	Wooden runway, for Cat. Nos. 19410 and 19491		15
46190	Section insulator, for Nos. 00, 000 and 0000 wires, 1200 volts	$36\frac{1}{2}$ "	1200
100176	Wooden runway, for Cat. No. 46190		20

600 VOLTS



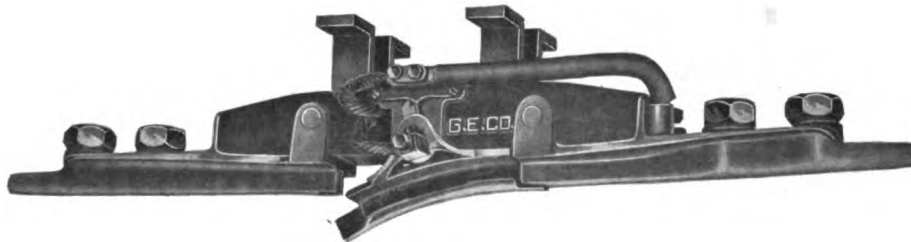
Overall length $31\frac{1}{2}$ in.

46740	Section insulator, for Nos. 0 and 00 wires, $\frac{3}{8}$ " tap, 7" break	1060
60434	Section insulator, for Nos. 00, 000 and 0000 wires, $\frac{3}{8}$ " tap, 7" break	1025
46741	Section insulator, for Nos. 0 and 00 wires, $\frac{1}{2}$ " tap, 7" break	1060
60435	Section insulator, for Nos. 00, 000 and 0000 wires, $\frac{1}{2}$ " tap, 7" break	1025
21456	Wooden runway, for Cat. Nos. 46740, 60434, 46741 and 60435	15

AUTOMATIC SECTION INSULATORS—600 VOLTS

This device is a combined Section Insulator and Automatic Section Switch, and, while it is designed especially for use in mine tramway work, may often be used to advantage on spur tracks in surface work where it is desirable to cut out the spur section after the car has run back on to the main line.

The switch blade is operated by the trolley wheel, and is permanently connected to the feeder or to the main line trolley wire.



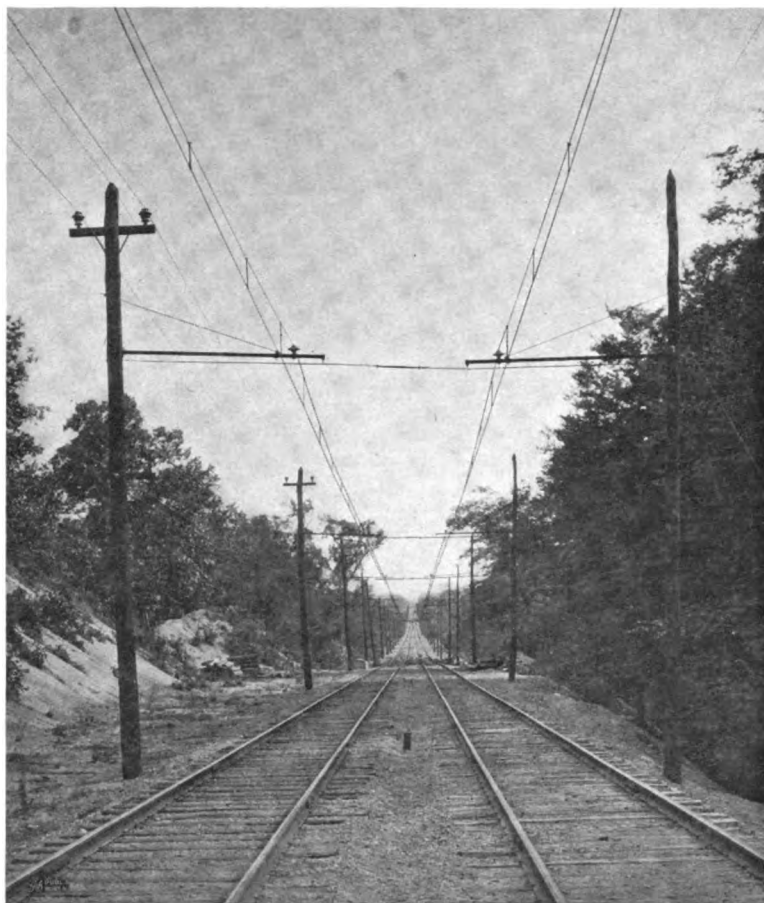
Overall length $30\frac{1}{2}$ in.; height $5\frac{1}{2}$ in.

Cat. No.	Description	Approx. Weight per 100
34870	Automatic section insulator, for Nos. 00, 000 and 0000 wires	1650
34871	Switch clips with screws	12
34872	Locking spring	5

Section insulators similar to the above, but for 1/0 wire will be furnished at the same price.

LINE MATERIAL FOR CATENARY CONSTRUCTION

The radical departure in the design of trolley line construction made necessary by the advent of high tension current distribution for electric railway operation resulted in great improvements in mechanical as well as electrical features of the trolley line. The catenary system of line construction, while providing ample insulation surface for the highest potentials used or contemplated, also incidentally affords marked mechanical improvement which is important with the high speeds of modern suburban and interurban operation, and steam railroad electrification.



Catenary Line Construction on the Washington, Baltimore and Annapolis Railway

In direct suspension construction the limit for pole spacing with reasonable sag in the trolley wire is approximately 100 ft. and the minimum deflection attainable with this spacing necessitates heavy upward tension on the trolley to maintain contact with the wire. In the catenary construction on the other hand the spacing of the poles is only a matter of weight of span which each pole can carry, and of sag permissible in the messenger cable. It has been found that, without unduly increasing the height and the weight of the poles, the spacing may be 150 ft. on tangents.

The catenary system which is equally applicable to bracket or cross span construction consists essentially of an arrangement of a slack messenger cable and suitable hangers so distributed as to maintain the trolley wire practically without sag between suspension points, or to limit the sag as may be necessary for various conditions of operation.

The blow of a collector passing suspension points at high speed is thus greatly reduced. The shorter distance between hangers necessitates less stress in the trolley wire and reduces danger of break in the line.

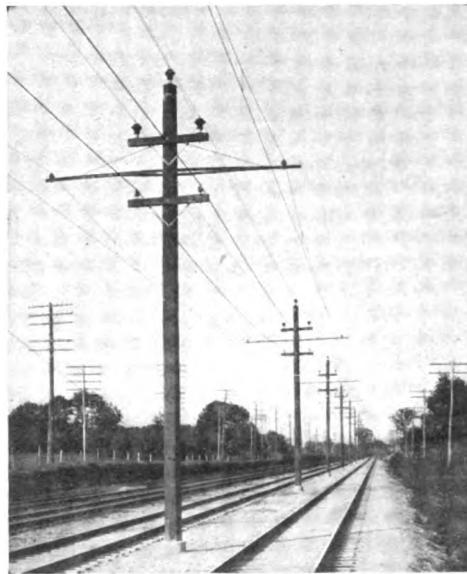
The catenary system, therefore, offers the mechanical advantages of a longer pole spacing and a flatter trolley wire, and a flexibility in the line which obviates the hammer blow of the collector at suspension points, and reduces danger of mechanical breakage.

LINE MATERIAL FOR CATENARY CONSTRUCTION

In catenary bracket construction, the messenger is carried by porcelain petticoat insulators on the bracket arms, and in cross span construction the messenger is insulated either by strain insulators introduced in the span wire or by an insulated messenger hanger or support. The strain insulators for this purpose and for all pull-offs and anchorages for voltages up to and including 3300 volts are of specially treated wood, while those for higher voltages are of porcelain *under compression*. *The entire insulating system is designed for three times the normal working voltage under the severest weather conditions.* This factor of safety in dielectric strength is of vital importance, especially in lines operating over steam railroad tracks, because of the deteriorating effect of deposit from smoke on the insulation surface.

The features of catenary construction which vary in adaptation to different operating conditions are the messenger and strain insulators and supports and the spacing of trolley wire hangers.

The three-point suspension in which, with 150 ft. pole spacing, the hangers are 50 ft. apart has been found ample to maintain a sufficiently level trolley wire for operation with wheel collector at



Double Track Tangent Construction

speeds up to sixty-five miles per hour. A new element is, however, introduced by the sliding pantograph or bow trolley which, on account of its great inertia, requires a closer spacing of the trolley supports. It has been found that an eleven-point suspension, which with 150 ft. pole spacing brings the hangers 13.6 ft. apart, renders the trolley wire sufficiently level for this type of collector.

All the catenary hangers catalogued in the following pages are of lengths suitable for a 22-inch deflection (distance between messenger and trolley wire at messenger supports) and this deflection is recommended excepting for special conditions.

In this section are listed the various devices which are distinctly for catenary work. Others such as splicing sleeves, low voltage strain insulators, frogs and crossings, are suitable for both direct suspension and catenary construction and are listed in the direct suspension section of this catalogue.

Lists of materials for various types of construction shown elsewhere in this catalogue are useful for general estimating purposes.

BRACKETS

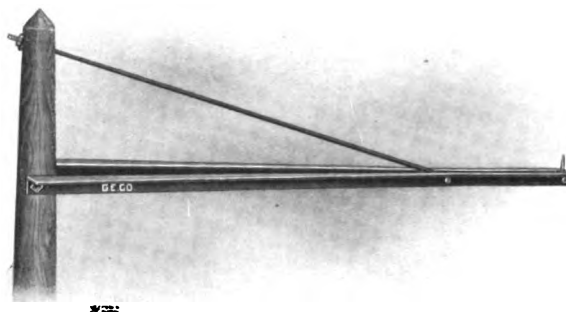
The angle iron bracket, by reason of its horizontal stiffness greatly facilitates initial adjustment of the messenger during installation and insures maintaining uniform sag in messenger span throughout the length of the tangent. Its horizontal stiffness is also of great value in case of line breakage, the line remaining undisturbed except for two or three spans on either side of the break.

The angle bracket consists of two 2 in. x 1½ in. x ¼ in. angle irons joined at the extreme end by a space block and rivet, and by a second space block approximately 2 ft. nearer the pole. The guy rod which supports the bracket from the pole top is attached to this second space block, and the

LINE MATERIAL FOR CATENARY CONSTRUCTION

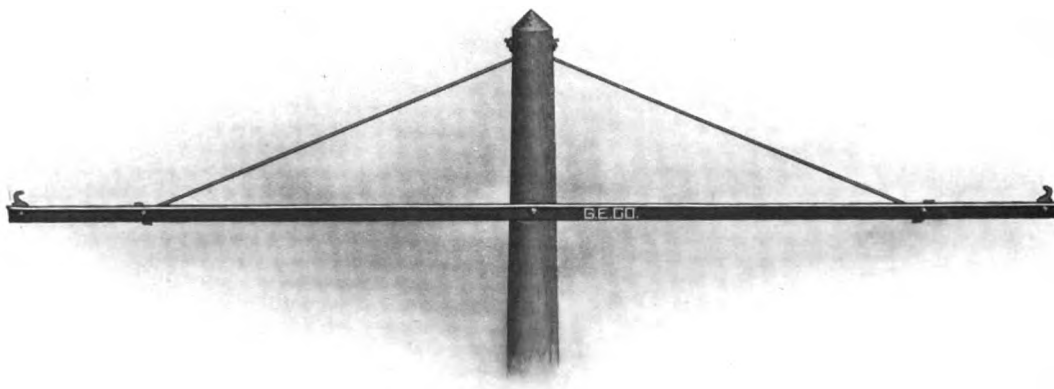
BRACKETS

slot formed between the angles by the space blocks through which the insulator pin bolt passes provides means for transverse adjustment of the messenger with respect to the track. The inner ends of the angles are sprung apart to span the pole to which they are lagged or bolted. This bracket is suitable for 7 ft. 6 in. distance between track center and pole face.



Angle Iron Bracket Arm
Cat. No. 43322

Cat. No.	Description	Approx. Weight per 100
43322	9 ft. Angle Iron Bracket, japanned	6000



Cat. No. 47016

For double track pole construction, a bracket arm having two guy rods and two sets of fittings is used. This double bracket is riveted at one end and bolted at the other to allow for spanning the pole in installation. It is 16 ft. over all and suitable for 14 ft. track center.

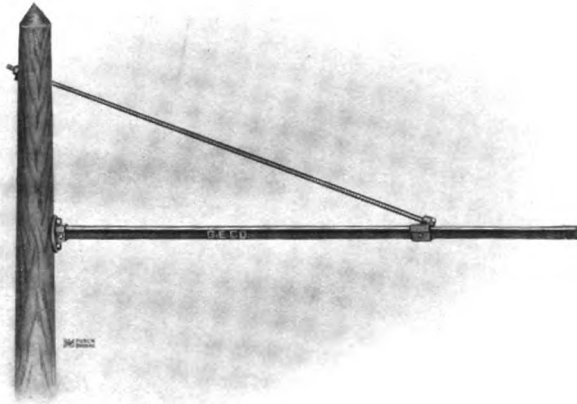
Cat. No.	Description	Approx. Weight per 100
47016	16 ft. Double Angle Iron Bracket, japanned	11000

LINE MATERIAL FOR CATENARY CONSTRUCTION

BRACKETS

The "T" iron bracket has all of the advantages of the angle iron bracket, excepting its stiffness in the horizontal plane.

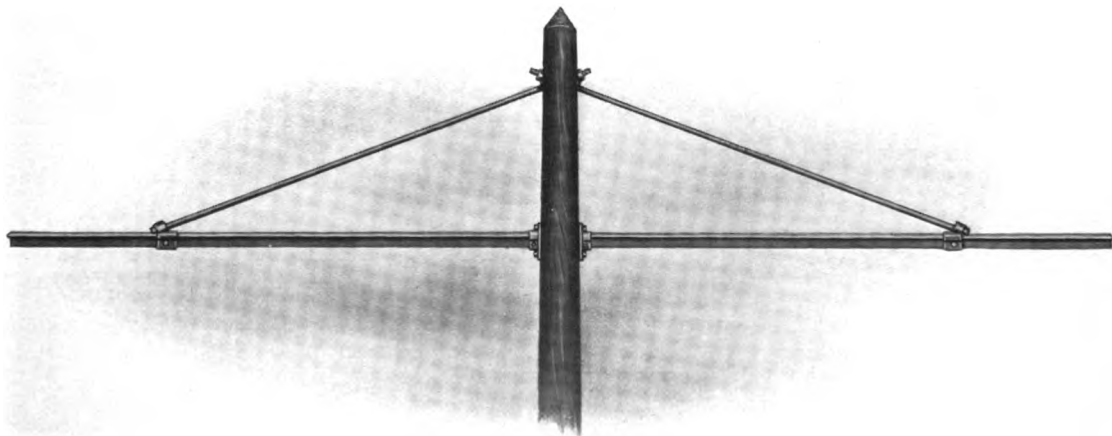
The guy rod is attached to the arm approximately 2 ft. from the end and the extension beyond the guy rod attachment provides for transverse adjustment of the messenger.



"T" Iron Bracket—Cat. No. 48414

The "T" iron bracket consists of a "T" iron arm $2\frac{1}{2}$ in. x $2\frac{1}{2}$ in. x $\frac{5}{16}$ in., guy rod, pole fitting and two 5 in. x $\frac{1}{2}$ in. lag screws but does not include insulator pin. The length of the standard "T" iron bracket is 8 ft. 6 in. which is suitable for 7 ft. 6 in. distance between track center and pole face.

Cat. No.	Description	Approx. Weight per 100
48414	8 ft. 6 in. "T" Bracket, japanned	5500



For double track work with 14 ft. track centers the "T" iron bracket consists of two arms, two guy rods and two sets of fittings, each arm being 7 ft. 6 in. long.

48415	Double "T" Iron Bracket with arms, 7 ft. 6 in. long, japanned	10000
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LINE MATERIAL FOR CATENARY CONSTRUCTION

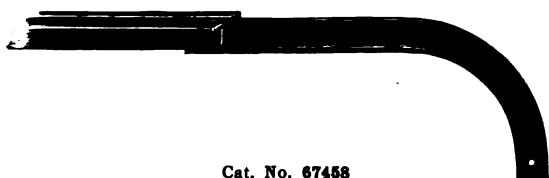
BRACKET EXTENSIONS



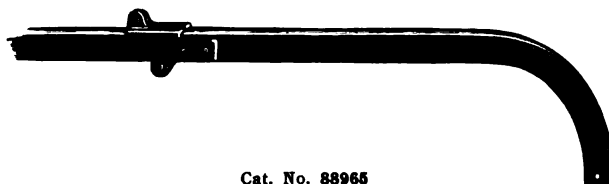
Double Track Pull-Off with Bracket Extensions

The extension for the angle iron bracket consists of a "T" iron 2 in. x 2 in. x $\frac{1}{4}$ in., the web of which fits into the slot of the bracket replacing the outer space block. A bolt is provided for securing the extension in place.

The extension for "T" iron brackets consists of "T" iron 2 in. x 2 in. x $\frac{1}{4}$ in. to which are riveted malleable iron castings for clamping to the bracket arm. Two bolts are furnished for securing it in place.



Cat. No. 67458



Cat. No. 88965

Cat. No.	Description	Approx. Weight per 100
67458	4 ft. Extension for Angle Iron Brackets, japanned	2000
88965	4 ft. Extension for "T" Iron Brackets, japanned	2600

INSULATOR PINS

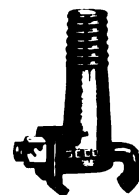
The insulator pin for the angle iron bracket is of malleable iron and engages the slot of the bracket, along which it is adjustable. It is clamped in position by a bolt passing upward through the slot. The diameter at the pin top is $1\frac{1}{4}$ in.

The pin for the "T" iron bracket is malleable iron with a hook bolt which permits adjustment of the pin along the bracket arm. The diameter at the pin top is $1\frac{1}{4}$ in.

Both insulator pins have the standard sherardized finish.



Cat. No. 46742



Cat. No. 48416

Cat. No.	Description	Approx. Weight per 100
46742	Insulator Pin for Angle Iron Bracket	200
48416	Insulator Pin for "T" Iron Bracket	250

LINE MATERIAL FOR CATENARY CONSTRUCTION

MESSENGER INSULATORS



Cat. No. 43324

Insulator Cat. No.	43324	48453
Diameter	4½"	7"
Height	3½"	4"
Top Groove Diameter	8"	8"
Side Groove Diameter	4"	4"
Test voltage	40,000	65,000
Line voltage	3,300	11,000
Size pin hole	1½"	1½"
Standard Glaze finish	Brown	Brown

Two Piece Insulator
Cat. No. 48453

The smaller of these two insulators is offered for voltages up to and including 3300 and the larger for voltages up to and including 11,000. Both insulators have been thoroughly tested out in years of service and are adequate for the service for which they are recommended. Both are threaded for cementing on 1½ in. pins.

The upper shell of the 11,000 volt insulator is grooved so as to limit fractures from missiles and leave sufficient porcelain for insulation against normal potential even after the edges have been broken off. Malicious breakage of insulators is responsible for more trouble in maintenance of high potential lines than any other cause. This grooving of the petticoat affords considerable insurance against grounding of the line.

To insure customers against defective insulators, it is recommended that insulators be generally purchased assembled on the pins so that purchasers may have the benefit of the high potential shop test after assembling. When assembling the insulators in the fields, the cementing should be done with a good grade of neat Portland cement.

For assembled insulators and pins, including high potential tests, an additional charge will be made.

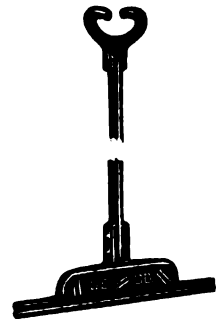
Cat. No.	Description	Approx. Weight per 100
43324	Messenger Insulator for voltages up to and including 3300	300
48453	Messenger Insulator for voltages up to and including 11000	450

TANGENT HANGERS

Form CF
Hanger

The Form CF hanger, for supporting the trolley wire from the messenger cable, consists of a stem of flat steel strip, riveted at one end to a malleable iron screw clamp trolley ear; at the other end the stem is bent to form a loop by which the hanger is suspended. The loop is so formed that the hanger cannot free itself of the messenger; at the same time it permits a 2¼ in. vertical movement of the trolley wire independently of the messenger.

The Form CA hanger differs from the Form CF only in that the messenger loop of the latter is replaced by a malleable iron sisterhook and its stem is turned through 90 degrees.



Form CA Hanger

FORM CF			FORM CA		
Cat. No.*	Length in In.	Approx. Wt. per 100	Cat. No.*	Length in In.	Approx. Wt. per 100
100078	6	73	48442	6	64
100079	6½	75	48443	6½	66
100080	8½	80	48444	8½	71
100081	11	86	48445	11	77
100082	12	88	48446	12	79
100083	13½	91	48447	13½	82
100084	14½	94	48448	14½	85
100085	16	97	48449	16	88
100086	17½	100	48450	17½	91
100087	19½	104	48451	19½	95
100088	20½	106	48452	20½	97

All hangers have standard sherardized finish throughout.

*These hangers are of lengths suitable for 22 in. deflection.

LINE MATERIAL FOR CATENARY CONSTRUCTION

TANGENT HANGERS

FORM CG

As an alternative to Forms CA and CF hangers, the Company offers its Form CG hanger which can be furnished as readily as the other two. It is made of $\frac{1}{8}$ in. x 1 in. flat steel strip with a loop formed at the top to fit over the messenger cable, allowing a play of 2 in. The trolley wire clamp is made of two interchangeable malleable iron castings. Both bolts used are standard machine bolts.



STEADY YOKES

On long tangents it may be desirable to steady the trolley wire against lateral movement and Trolley Wire Steadies are provided for this purpose. They are installed at intervals of about 1000 feet and, for bracket construction and either Forms CA, CF or CG hangers, consist of the steady yoke, steady ear, strain insulators, bracket extension, eye bolt and steel cable for the guys. The arrangement is illustrated on page 100. The steady ear generally used is Cat. No. 37685, 10-inch curve clamping ear. The eye bolt should be threaded for at least four inches of its length to permit adjustment. The size recommended is 16 in. x $\frac{5}{8}$ in.



Cat. No.	Description	Approx. Weight per 100
111099	Steady Yoke, $\frac{3}{4}$ " stud, mall. iron sherardized	200

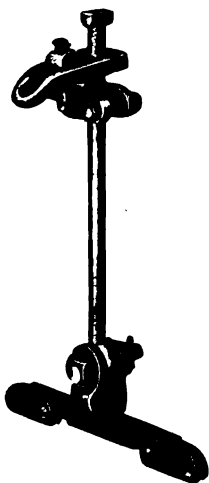
PULL-OFF HANGERS

In order to insure clearances for the passage of sliding collectors, the pull-off hangers are designed for use with bridles which are attached to the ear and the upper part of the pull-off stem, and which lead to the pull-off insulator or to a steel ring into which the wire is made up.

The Form CF pull-off hanger is provided with a messenger clamp having an eye for single guying and also a slot for a guy wire from the second line in double track construction. The messenger clamp is free to move vertically between the top of the hanger stem and the adjustable stem clamp. An adjustment of six in. below the nominal length of the hanger is entirely feasible so that two lengths of hangers will provide for pull-offs at any point in the line. The stem is $\frac{1}{2}$ in. in diameter.

The Form CA pull-off hanger differs from the Form CF primarily in that the messenger clamp casting is threaded to the stem and the distance between messenger and trolley wire is therefore fixed by adjustment when installing. These hangers are adjustable through a length of one and one half in. greater and less than the nominal length. The stem of the Form CA hanger is $\frac{3}{4}$ in. in diameter.

Both CF and CA pull-off hangers have standard sherardized finish throughout.



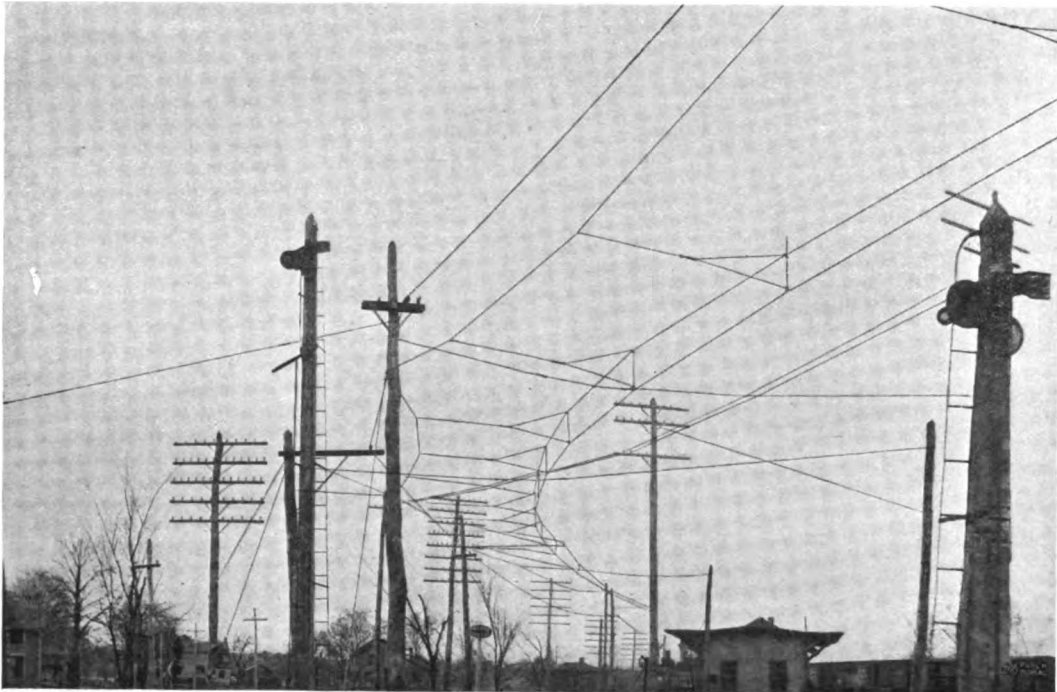
Form CF Pull-Off Hanger

FORM CF			FORM CA		
Cat. No.	Length in In.	Approx. Wt. per 100	Cat. No.	Length in In.	Approx. Wt. per 100
68931	15	400	48439	14	480
68932	18	410	48440	17	500
68933	21	420	48441	20	520

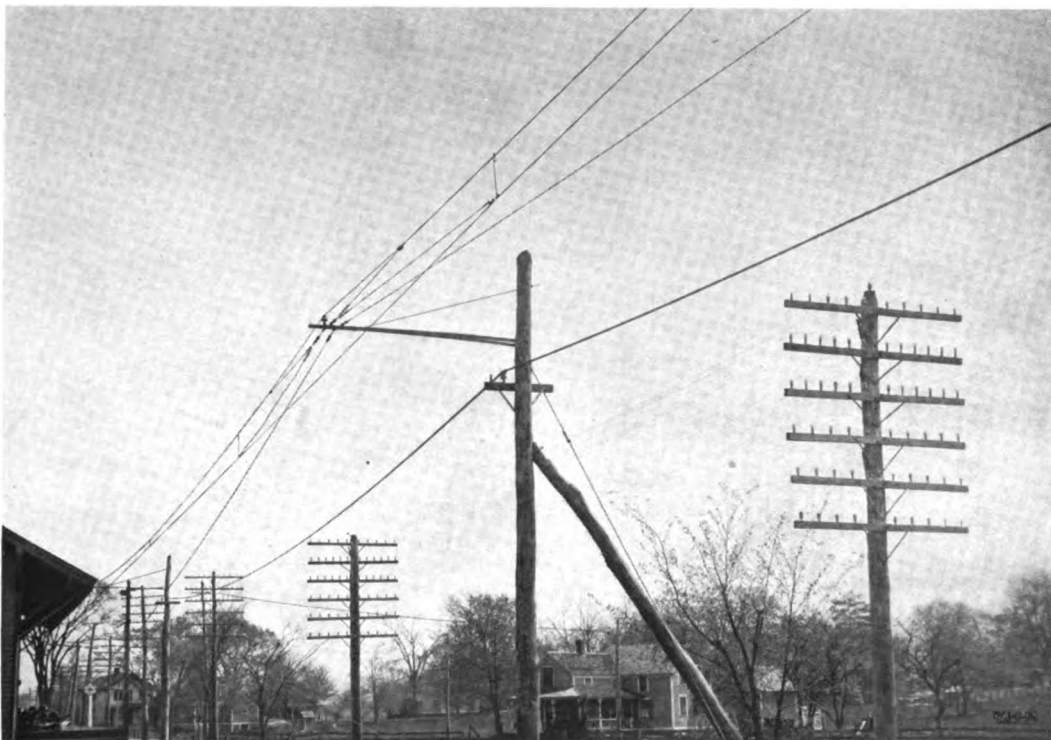


Form CA Pull-Off Hanger

LINE MATERIAL FOR CATENARY CONSTRUCTION



Single Track Curve with Form CF Pull-Offs



Single Track Anchorage—Form CF

LINE MATERIAL FOR CATENARY CONSTRUCTION

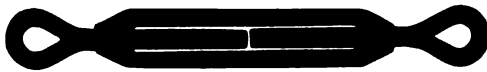
ANCHORAGE MATERIAL

To provide vertical flexibility at anchorage points in lines using the Form CF tangent and pull-off hangers, the trolley wire and messenger are clamped independently and the clamps guyed to the anchor eye through a strain insulator and a turnbuckle.

The Form CA anchor hanger for use with Form CA tangent and pull-off hangers is fitted with a $\frac{1}{2}$ in. steel stem and is arranged for guying to the anchor eye through a bridle with suitable strain insulator and turnbuckle.

Either method of anchoring provides ample clearance for sliding collectors and prevents forming "pockets" or angles between trolley and guy wires in which a collector may catch.

All anchorage devices excepting ears which are of composition and tinned for soldering are sherar-dized throughout.



Cat. No. 48522



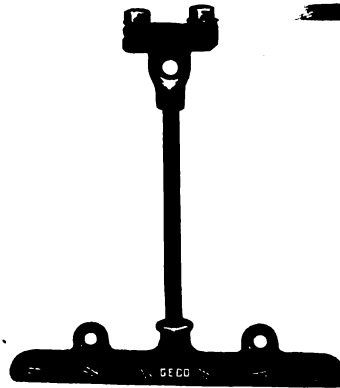
Cat. No. 61232



Cat. No. 46572



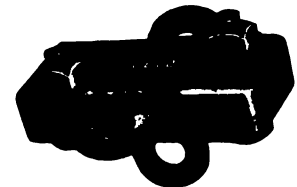
Cat. No. 48417



Cat. No. 64368



Cat. No. 100217



Cat. No. 46703

Cat. No.	Description	Approx. Weight per 100
100217	Messenger Anchor Clamp	300
*61232	Trolley Wire Anchor Ear	90
64368	15 1/4" Form CA Anchor Hanger	360
48522	Anchor Turnbuckle, 6" x 1/2"	200
46572	Anchor Eye for Angle Iron Bracket	300
48417	Anchor Eye for "T" Iron Bracket	250
46703	Span Wire Anchor Clamp	525

* Half strain soldered clinch ears may be used if preferred.

SPAN WIRE MESSENGER HANGERS

The span wire messenger hangers for the attachment of the messenger to the cross span are used throughout tangents and curves in cross span construction, excepting where replaced at anchorages by the span wire anchor clamp. The hangers are arranged for adjustment to any angle between the messenger and span wires.

The insulation of Cat. No. 48454 is a porcelain spool. Provision for drainage of moisture from the upper surface is made through the center along the metal stud.



Cat. No. 60958



Cat. No. 48454

LINE MATERIAL FOR CATENARY CONSTRUCTION

SPAN WIRE MESSENGER HANGERS—(Concluded)

Cat. No.	Description	Approx. Weight per 100
60958	Span Wire Messenger Hanger, sherardized	80
48454	Insulated Span Wire Messenger Hanger, metal parts sherardized	430

STRAIN INSULATORS

The strain insulators used in catenary work are the same as for direct suspension construction shown on page 59, excepting the following porcelain insulators.

The strain insulators for high potentials possess mechanical and electrical features of vital importance. The interlinking of the holes provided for attachment of the guy wires brings the material under mechanical stress entirely in compression and the crushing strength of the material is considerably above the maximum stress to which it can be subjected in service. Because of the form of the insulator it is impossible for rain driving in any direction to maintain a continuous surface between terminals. All surfaces are exposed to the washing action of rain from different directions so that accumulation of dust or harboring of insects is prevented.

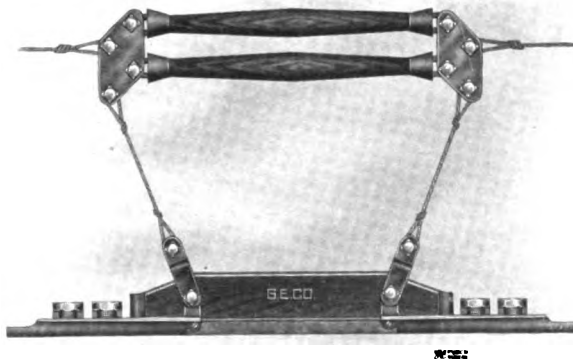


Cat. No. 45207

Cat. No.	Description	Approx. Weight per 100
45207	6½" Strain Insulator, max. safe working voltage 11000 max. safe working load 2500 lbs.	350
61912	7½" Strain Insulator, max. safe working voltage 15000 max. safe working load 4500 lbs.	1050

SECTION INSULATORS

600 VOLTS



Cat. No. 89586

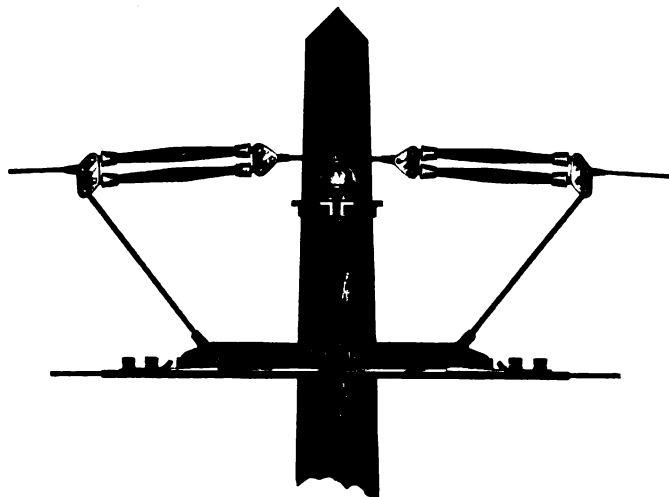
In the section insulators for wheel collectors, the trolley insulation is provided by a device similar to the Form L direct suspension section insulator excepting that the wood beams and runways are longer and adapted to care for higher voltages and speeds. The messenger insulation consists of wood strains.

Cat. No.	Description	Approx. Weight per 100
89586	Section Insulator, complete, for Nos. 00, 000 and 0000 wires, 7" break	2000
100247	Trolley Insulator only, for Cat. No. 89586	1200
100176	Wooden Runway for Cat. No. 100247	20

LINE MATERIAL FOR CATENARY CONSTRUCTION

SECTION INSULATORS

1200-3300 VOLTS



Cat. No. 43705

Cat. No.	Description	Approx. Weight per 100
43705	Section Insulator, complete, for Nos. 00, 000 and 0000 wires, 24" break, 1200-2400 volts	3300
60436	Trolley Insulator only, for Cat. No. 43705	1700
100177	Wooden Runway for Cat. No. 60436	35
112151	Section Insulator, complete, for Nos. 00, 000 and 0000 wires, 36" break, 3300 volts	5000
112152	Trolley Insulator only, for Cat. No. 112151	3000
112153	Wooden Runway for Cat. No. 112152	75

3300-11000 VOLTS FOR WHEEL AND SLIDING COLLECTORS

The section insulator for use with both wheel and sliding collectors consists of a wooden beam of large cross section to which terminal castings are attached by through bolts insulated from the beam by porcelain spool insulators. A 60 in. renewable runway on the bottom offers a level passage for any style of collector. The messenger is insulated by wood and porcelain strain insulators in series.



Cat. No. 60433

Cat. No.	Description	Approx. Weight per 100
60433	Section Insulator, complete, for Nos. 00, 000 and 0000 wires, 60" break	15000
100178	Wooden Runway for Cat. No. 60433	250

LINE MATERIAL FOR CATENARY CONSTRUCTION

STEEL STRAND

Common galvanized strand is not recommended for any purpose in catenary construction and wherever steel strand is used it should be one of the three special grades, properties of which are given in the following table.

PROPERTIES OF SEVEN STRAND WIPED GALVANIZED STEEL CABLE SIEMENS-MARTIN STRAND 90,000 LB. PER SQ. IN.

Dia. in In.	Tensile Strength in Lb.	Elastic Limit in Lb.	Elongation	Lay in In.
$\frac{1}{4}$	3060	1830	6-9%	3
$\frac{5}{16}$	4850	2910	6-9%	3½
$\frac{3}{8}$	6800	4080	5-8%	4
$\frac{7}{16}$	9000	5300	5-8%	4½
$\frac{1}{2}$	11000	6600	5-8%	4½
$\frac{5}{8}$	19000	11400	4-6%	5

HIGH STRENGTH OR SECOND GRADE, 150,000 LB. PER SQ. IN.

$\frac{1}{4}$	5100	3315	3-5%	3½
$\frac{5}{16}$	8100	5265	3-5%	4
$\frac{3}{8}$	11500	7475	3-5%	4½
$\frac{7}{16}$	15000	9500	3-5%	5
$\frac{1}{2}$	18000	11700	3-5%	5
$\frac{5}{8}$	25000	16250	2-4%	5½

EXTRA HIGH STRENGTH OR THIRD GRADE, 225,000 LB. PER SQ. IN.

$\frac{1}{4}$	7600	5700	2½-4%	4
$\frac{5}{16}$	12100	9075	2½-4%	4½
$\frac{3}{8}$	17250	12930	2½-4%	5
$\frac{7}{16}$	22500	16800	2½-4%	5½
$\frac{1}{2}$	27000	20250	2½-4%	5½
$\frac{5}{8}$	42000	31500	1½-3%	6

WEIGHT

Dia. in In.	Per 1000 Ft. Lb.	Per Mile Lb.	Dia. in In.	Per 1000 Ft. Lb.	Per Mile Lb.
$\frac{1}{4}$	115	607	$\frac{7}{16}$	370	1953
$\frac{5}{16}$	210	1108	$\frac{1}{2}$	510	2692
$\frac{3}{8}$	300	1584	$\frac{5}{8}$	700	3696

For ordinary conditions, the messenger cable should be of $\frac{7}{16}$ in. extra galvanized Siemens-Martin steel. For pull-offs $\frac{1}{4}$ in. cable is satisfactory, and for general guying purposes $\frac{3}{8}$ in. extra galvanized Siemens-Martin strand is generally recommended. Special conditions may call for "high strength" cable, but as this cable requires mechanical fastenings on account of its stiffness, it should be used only where absolutely necessary.

DEFLECTORS



Deflectors are for use with sliding collectors and are designed to depress the collector when a car is turning from a siding to the main line, or crossing from one track to another, and are interchangeable on either right or left hand turnouts and on Nos. 00, 000 and 0000 grooved wires. Deflectors must be designed especially for local conditions and prices will be quoted on specification of crossing or divergence angles and conditions of operation. These deflectors will not interfere with the operation of wheel collectors.

LINE MATERIAL FOR CATENARY CONSTRUCTION

CONSTRUCTION NOTES

HANGERS FOR SHORT TANGENT SPANS

To prevent creeping of the messenger and unequal strains at the brackets, the tension of the messenger wire is made the same in short spans as in the 150 ft. spans; and with this constant tension, the sag of the messenger and consequently the length of the trolley hangers vary with the length of span. The number and length of hangers required for different spans is shown in the following table:

ELEVEN-POINT CONSTRUCTION

Length Pole Spacing	Points	NUMBER OF HANGERS PER SPAN										
		6"	6½"	8½"	11"	12"	13½"	14½"	16"	17½"	19½"	20½"
150 ft.	11	1	2	2	2	—	—	2	—	—	2	—
125 ft.	9	—	—	—	1	2	2	—	2	—	2	—
110 ft.	8	—	—	—	—	—	2	2	—	2	—	2
95 ft.	7	—	—	—	—	—	—	—	3	2	—	2
80 ft.	6	—	—	—	—	—	—	—	—	2	2	2
70 ft.	5	—	—	—	—	—	—	—	—	—	3	2
55 ft.	4	—	—	—	—	—	—	—	—	—	—	4

THREE-POINT CONSTRUCTION

150 ft.	3	1	—	—	—	—	—	2	—	—	—	—
125 ft.	3	—	—	—	1	—	—	—	—	2	—	—
110 ft.	3	—	—	—	—	—	1	—	—	2	—	—
95 ft.	3	—	—	—	—	—	—	—	1	—	2	—
80 ft.	3	—	—	—	—	—	—	—	—	1	2	—
70 ft.	2	—	—	—	—	—	—	—	—	—	—	2
55 ft.	2	—	—	—	—	—	—	—	—	—	—	2

CURVE CONSTRUCTION

In all curve work the use of pull-off hangers is recommended to secure the proper curvature of messenger and trolley wire. On curves not sharper than 10 degrees or 574 ft. radius, pull-off hangers bridled to a backbone run between the line poles or bracket extensions, depending on whether the poles are set outside or inside the curve, are recommended. On all curves sharper than 10 degrees it is generally cheaper and better practice to set the line poles or extra guy poles outside the curve and to bridle the pull-off hangers to a backbone run between them. On sharp curves the bracket extension method would require a close pole spacing which in the interest of economy should be avoided.

In general the adoption of some standard pole spacing for curves is preferable as it will reduce the number of special length hangers to be carried in stock. As an assistance to this end the following table is given, designating definite pole spacings for the various degrees of curvature and also indicating the number and lengths of tangent and pull-off hangers per span. This pole and pull-off spacing will keep the trolley wire within from four to six inches of the track center.

ELEVEN-POINT CURVE CONSTRUCTION

Angle of Curve	Radius		Pole Spacing	No. Pull- off Point	NUMBER OF HANGERS PER SPAN												
					Straight Line Hangers											Pull-Off Hangers	
					6"	6½"	8½"	11"	12"	13½"	14½"	16"	17½"	19½"	20½"	14"	17"
0°- 2°	0	2865	150	1	1	2	2	2	—	—	2	—	—	1	—	—	1
2°- 4°	2865	1433	150	2	1	2	2	2	—	—	—	—	—	2	—	2	—
4°- 6°	1433	955	125	2	—	—	—	1	2	—	—	2	—	2	—	—	—
6°-10°	955	574	95	2	—	—	—	—	—	—	—	3	—	—	2	—	2
10°-14°	574	410	95	3	—	—	—	—	—	—	—	2	—	—	2	—	3
14°-20°	410	288	70	3	—	—	—	—	—	—	—	—	—	2	2	—	—
	288	150	70	4	—	—	—	—	—	—	—	—	—	—	2	—	—
	150	75	55	6	—	—	—	—	—	—	—	—	—	—	—	—	4
	75	40	50	8	—	—	—	—	—	—	—	—	—	—	—	—	8

LINE MATERIAL FOR CATENARY CONSTRUCTION

THREE-POINT CURVE CONSTRUCTION

Angle of Curve	Radius		Pole Spacing	No. Pull-off Points	NUMBER OF HANGERS PER SPAN													Pull-Off Hangers		
					Straight Line Hangers															
					6"	6½"	8½"	11"	12"	13½"	14½"	16"	17½"	19½"	20½"	14"	17"	20"		
0°- 2°	0	2865	150	1	1	-	-	-	-	-	2	-	-	-	-	-	-	1	-	
2°- 4°	2865	1433	150	2	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	
4°- 6°	1433	955	125	2	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	
6°-10°	955	574	95	2	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	
10°-14°	574	410	95	3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	
14°-20°	410	288	70	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
	288	150	70	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	
	150	75	55	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	
	75	40	50	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	

STAGGERING TANGENT LINE

Where sliding collectors are used it is recommended that the tangent line be staggered by means of steadies guyed in opposite directions, to avoid wearing grooves in the collector contact surface. (In bracket construction the standard bracket extensions are used in guying the outside steady yoke arm.)

For this purpose the trolley wire should be displaced approximately eight in. on each side of the track center every 1000 ft., *i.e.*, there should be one complete wave from the extreme position on one side across the track and back to the extreme position on the same side in each 2000 ft. of line.

When the roadbed is new it is well to simply make provisions for staggering, but to defer the actual displacement of the trolley wire until the roadbed is settled and put in final shape, as the sway of the car due to irregularities in the track may be enough to throw the sliding contact entirely off the wire.

GENERAL INFORMATION

The problem of installing catenary material is somewhat different from that in connection with the installation of ordinary direct current construction, on account of the requirements imposed by the messenger cable. To obtain a line which will not require frequent re-adjustment the messenger cable must be installed with practically uniform tension throughout its entire length, that is, the shorter spans require less sag. For this reason certain definite pole spacings have been recommended in the foregoing tables with corresponding hanger lengths. When these hangers are used and the messenger adjusted to bring the trolley wire a uniform distance above the track, the messenger cable will have the correct tension.

As there are in this construction two wires to be provided for instead of one, it is necessary to make suitable provisions for two wires in special work, pull-offs and anchors.

METHOD OF INSTALLATION

BRACKET CONSTRUCTION

After the poles are installed, the brackets should be located at a height of eighteen in. more than the required distance between the top of the rail and the trolley wire; this allows for two in. sag of the bracket due to the yielding of the pole when loaded, in single track construction. For double construction this distance should be sixteen in. greater than the desired height of trolley above the top of rail.

Generally no back guys are required for this construction on tangent track but all poles on curves and at anchor points should be properly guyed. This Company recommends the use of strain insulators in all guy cables.

When brackets and insulators are in place the line is ready for the trolley and messenger wires. The foreman doing the construction work can soon determine what method of running out the trolley and messenger wires is best suited to the conditions under which he has to work. The following method of installation is suggested and is known from experience to be efficient and practicable.

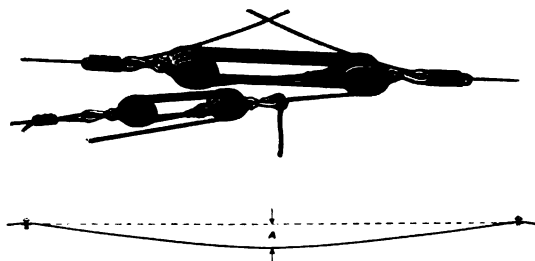
The trolley and messenger wire may both be run out at once and hung over the brackets, except at curves where the trolley wire should be supported below the bracket arms. The trolley wire should then be pulled up tight and temporarily anchored while resting on the bracket arm.

LINE MATERIAL FOR CATENARY CONSTRUCTION

METHOD OF INSTALLATION

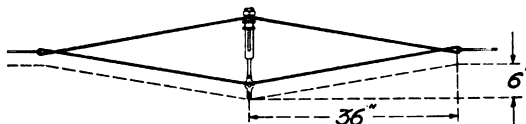
BRACKET CONSTRUCTION—(Concluded)

In ordinary construction it is generally inconvenient to measure the tension on the trolley wire. For this reason it is recommended, in order to obtain the desired tension of about one thousand pounds for 0000 trolley wire, that the pull be made with a pair of three sheave blocks, and a "luff" or purchase with a pair of two sheave blocks. Three men can pull a trolley to about the right tension with this combination.



The messenger wire should next be adjusted for tension to give the sag at (A) in the accompanying sketch of about 9 in. at 30 degrees F., 10 in. at 60 degrees F., and 11 in. at 85 degrees F., after which it may be lifted in position on the insulators and tied in. The trolley wire should then be dropped and temporarily supported by hooks from the brackets and

from the messenger wire at the center of the span. The line will then be ready for the hangers which should be installed in accordance with the table given on page 88. Both messenger and trolley wires should be anchored every one-half mile on tangent track, and at the ends of tangent track approaching a curve. Sufficient slack should be left in the curves to allow the trolley and messenger wires to



Sketch of Clearance

be pulled over to the center of the track. Where bridles for pull-offs and anchors are used, care should be taken to see that no wires are allowed within a space six inches above the plane of the trolley wire at a distance of three feet from the trolley wire. This clearance is necessary to avoid interference with sliding contacts.

SPAN CONSTRUCTION

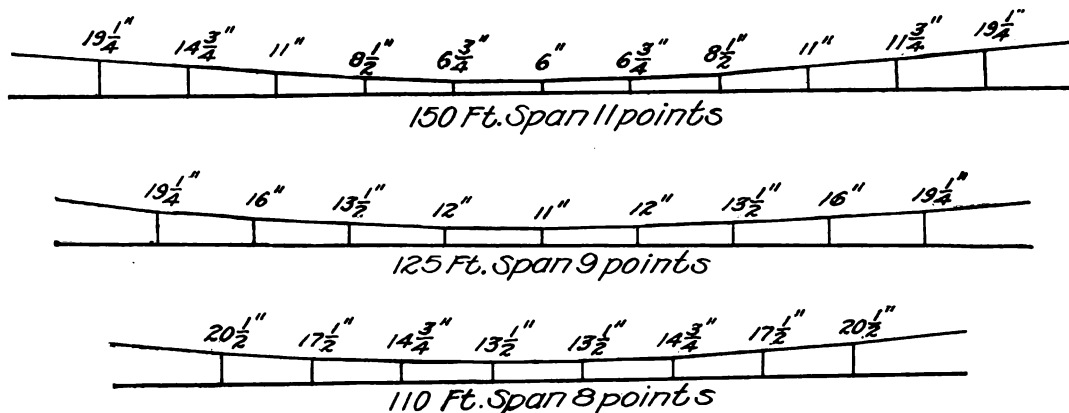
In span construction the span wire should be installed so that when the weight of the messenger and trolley is put on it, there will be a sag of about one foot for each 20 ft. of span, and the back guys should be insulated for full line potential.

After the poles are guyed and the spans in place, the messenger and trolley wires are run out and hung temporarily from the span wires by hooks. The tension on the trolley and messenger wires and the installation of hangers may then proceed as in bracket construction.

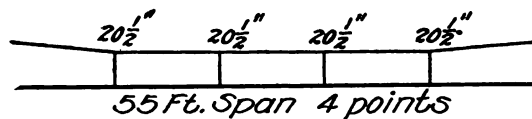
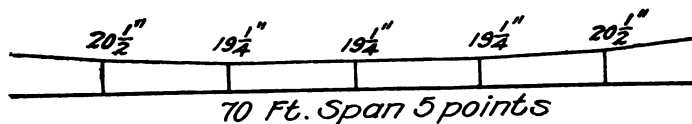
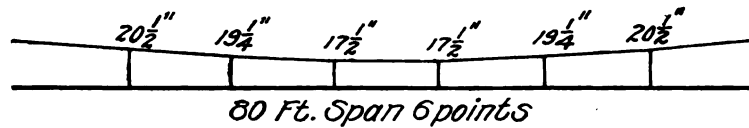
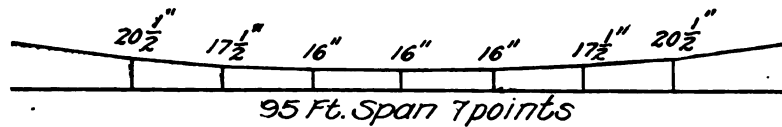
The following sketches and diagrams show convenient methods of satisfying conditions met in every day practice.

HANGERS FOR ELEVEN-POINT TANGENT TRACK CONSTRUCTION AND SHORT SPANS

(FOR 22-INCH DEFLECTION)

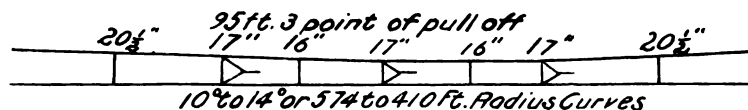
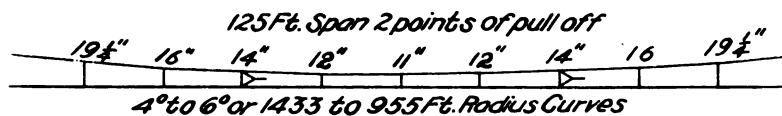
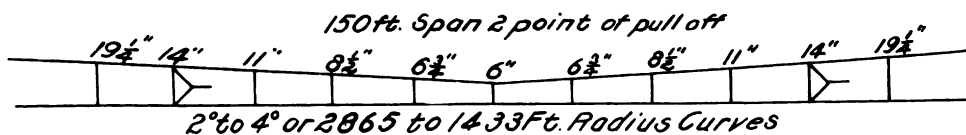
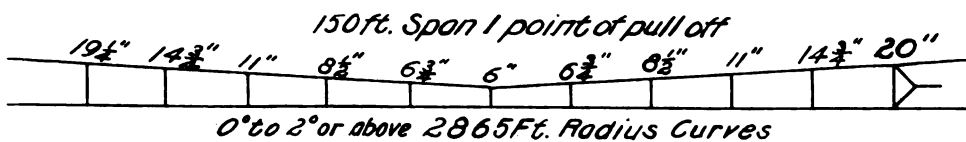


LINE MATERIAL FOR CATENARY CONSTRUCTION HANGERS FOR ELEVEN-POINT TANGENT TRACK CONSTRUCTION AND SHORT SPANS

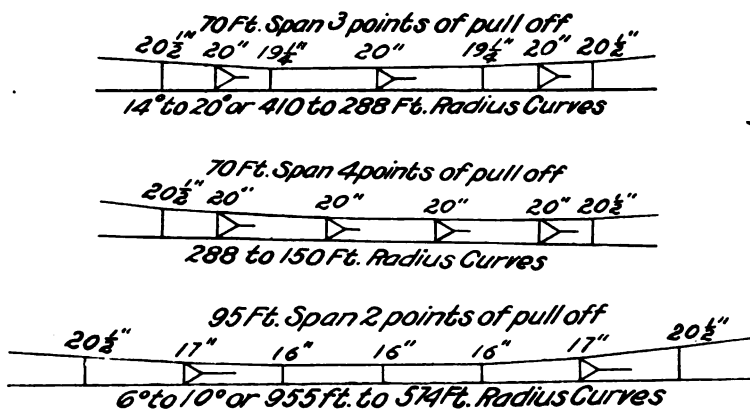


HANGERS FOR ELEVEN-POINT CURVE CONSTRUCTION AND SHORT SPANS

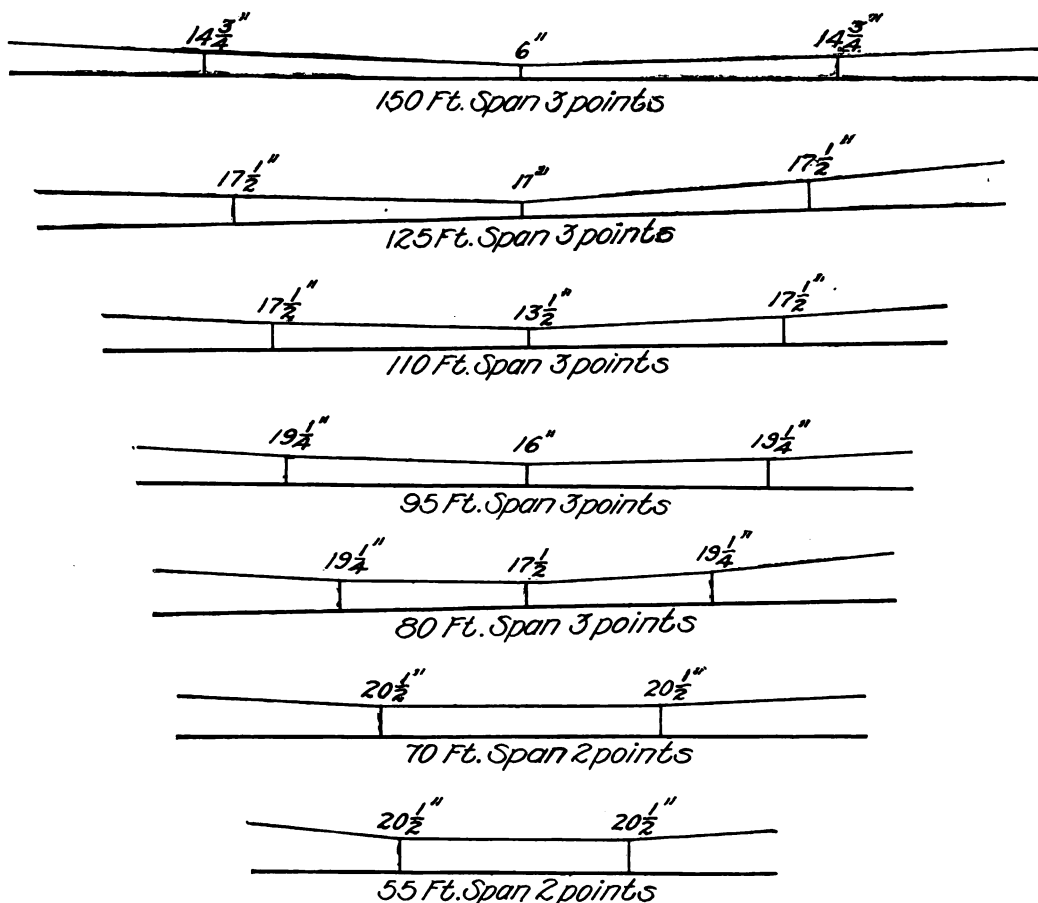
(FOR 22-INCH DEFLECTION)



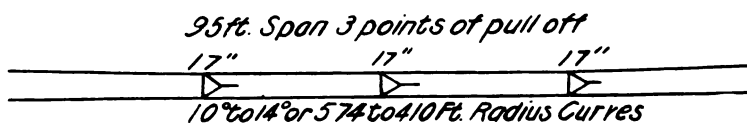
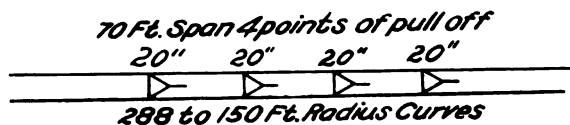
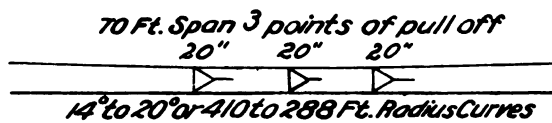
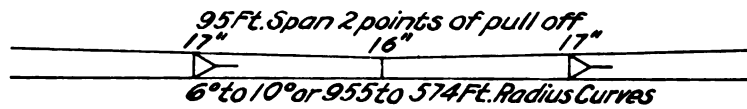
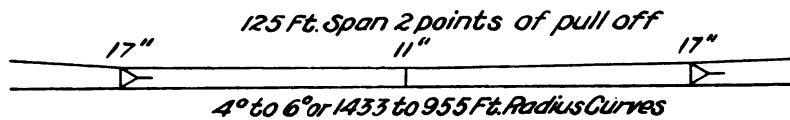
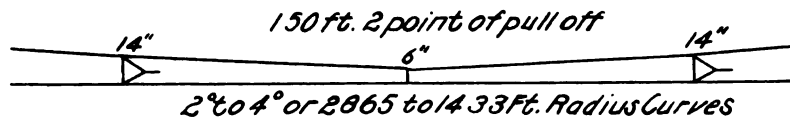
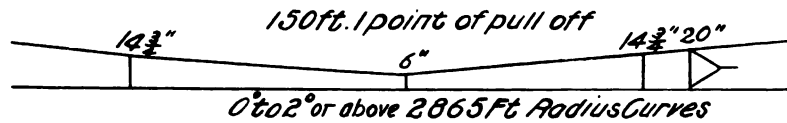
LINE MATERIAL FOR CATENARY CONSTRUCTION
HANGERS FOR ELEVEN-POINT CURVE CONSTRUCTION AND SHORT SPANS
 (FOR 22-INCH DEFLECTION)



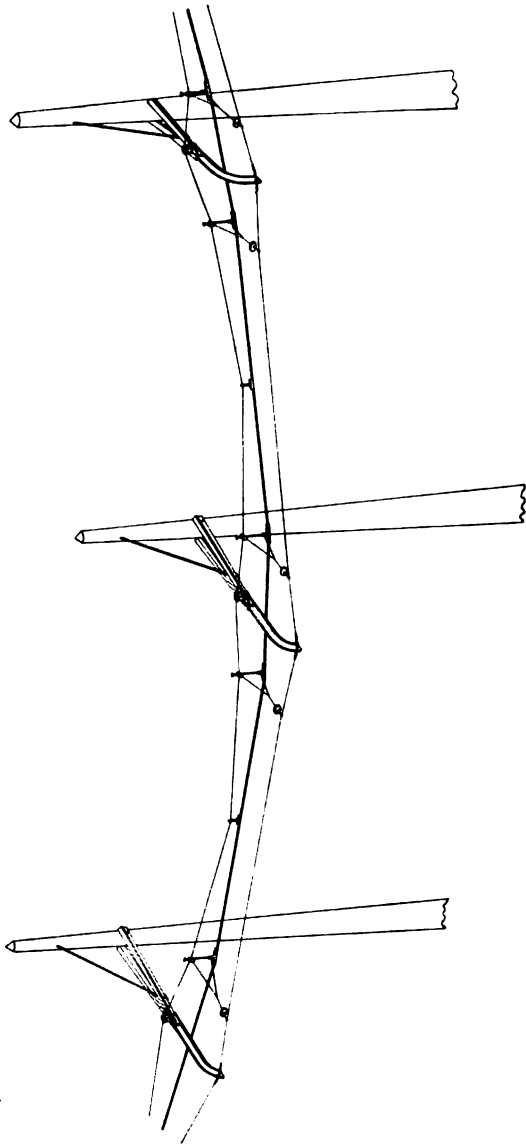
HANGERS FOR THREE-POINT TANGENT TRACK CONSTRUCTION
AND SHORT SPANS
 (FOR 22-INCH DEFLECTION)



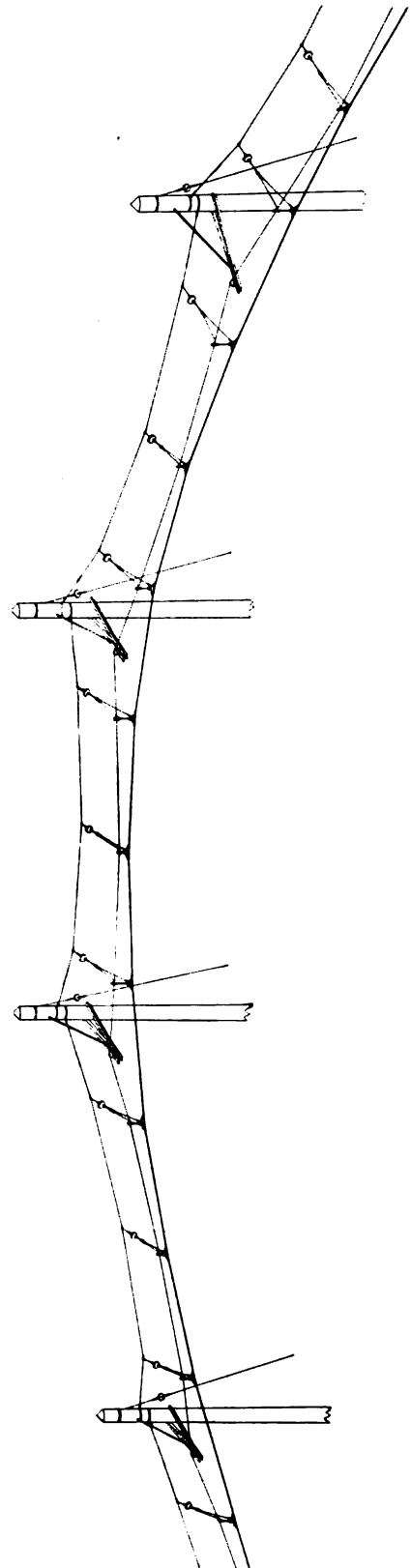
LINE MATERIAL FOR CATENARY CONSTRUCTION
HANGERS FOR THREE-POINT CURVE CONSTRUCTION AND SHORT SPANS
 (FOR 22-INCH DEFLECTION)



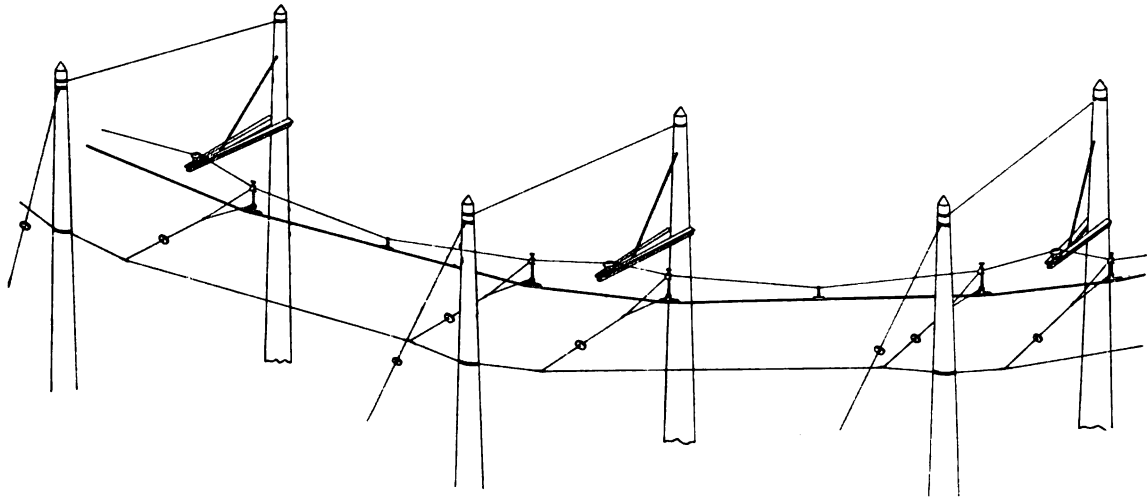
LINE MATERIAL FOR CATENARY CONSTRUCTION



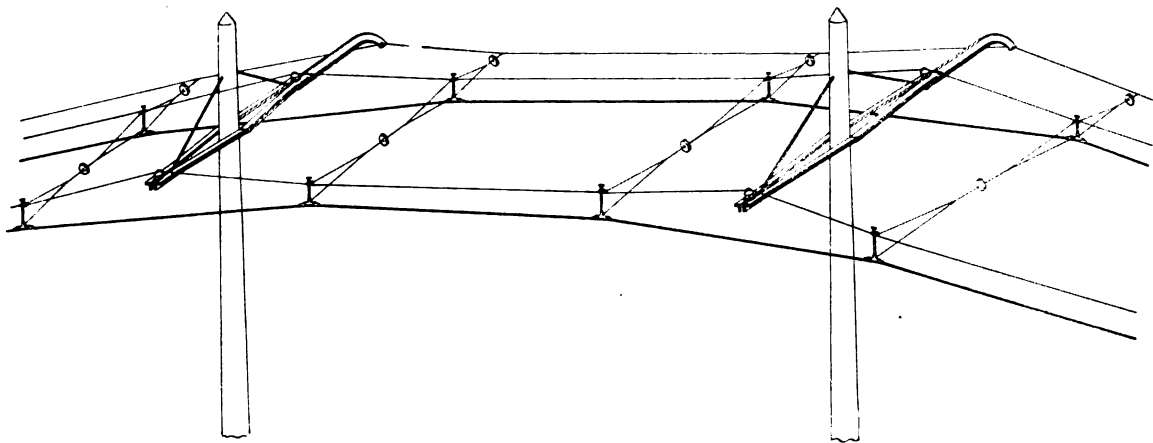
Single Track Curve Construction—With Bracket Extensions



Single Track Curve Construction—With Backbone between Line Poles

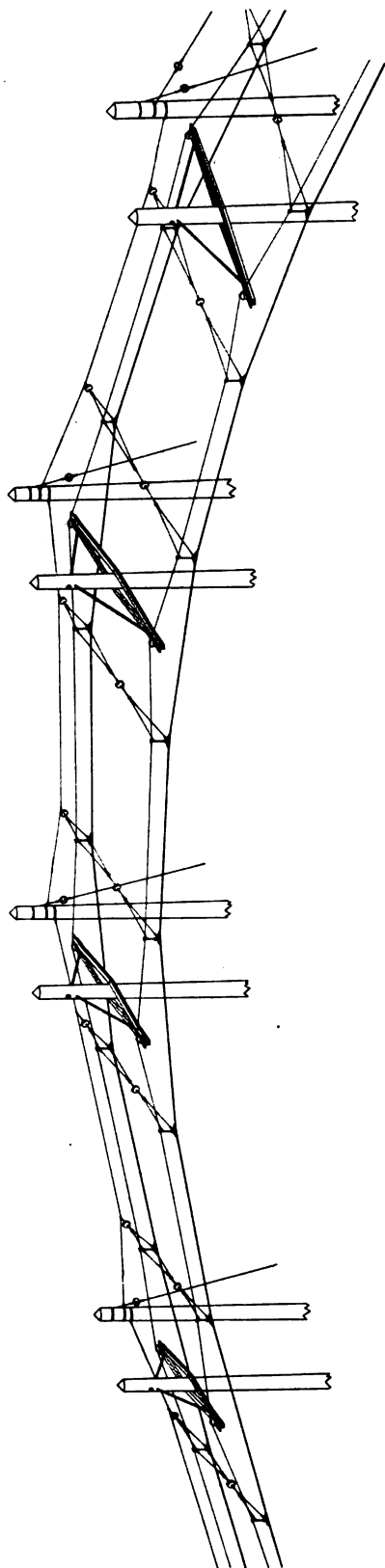
LINE MATERIAL FOR CATENARY CONSTRUCTION

Single Track Curve Construction—With Extra Poles Set for Backbone

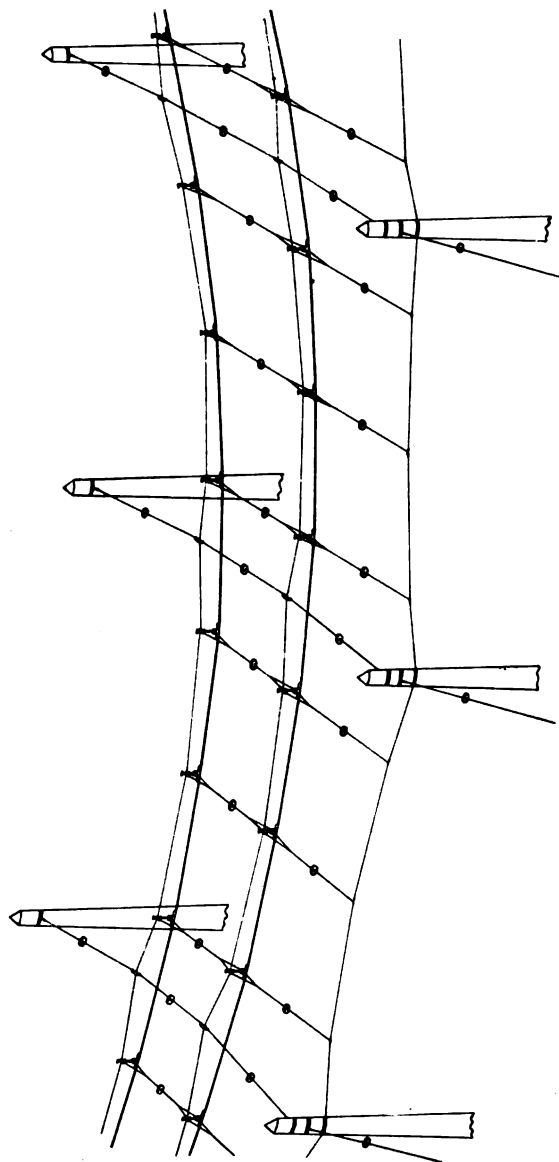


Double Track Curve Construction—With Bracket Extensions

LINE MATERIAL FOR CATENARY CONSTRUCTION

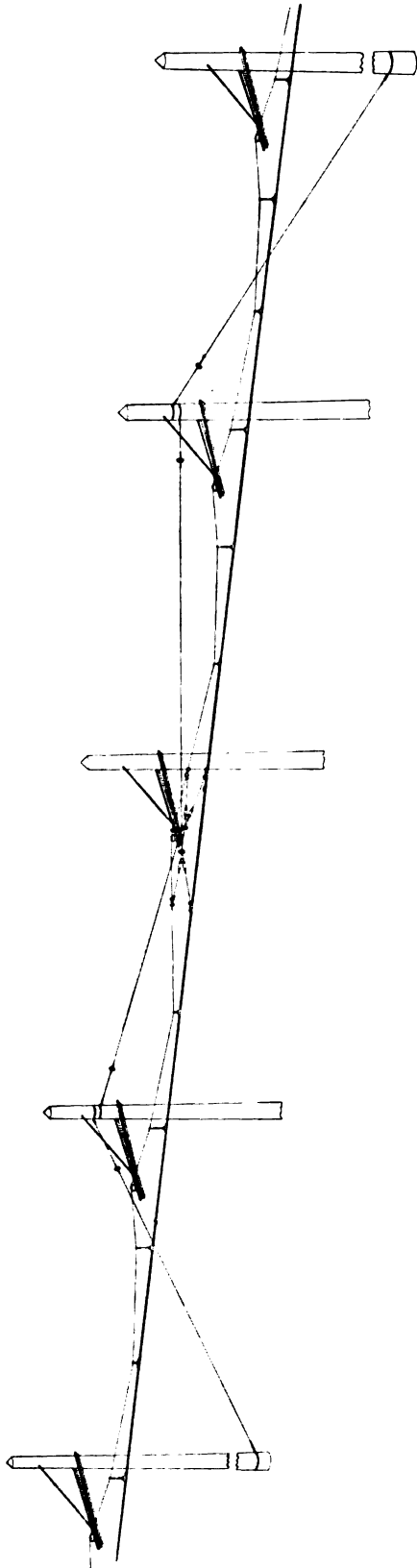


Double Track Curve Construction—With Extra Poles Set for Backbone

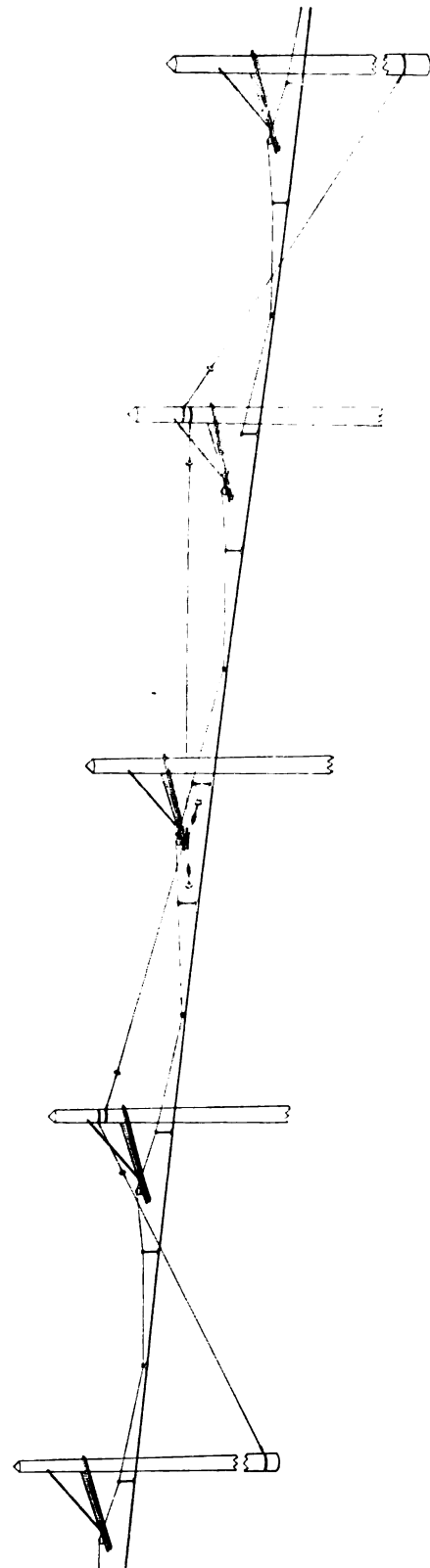


Double Track Cross Span Curve Construction

LINE MATERIAL FOR CATENARY CONSTRUCTION

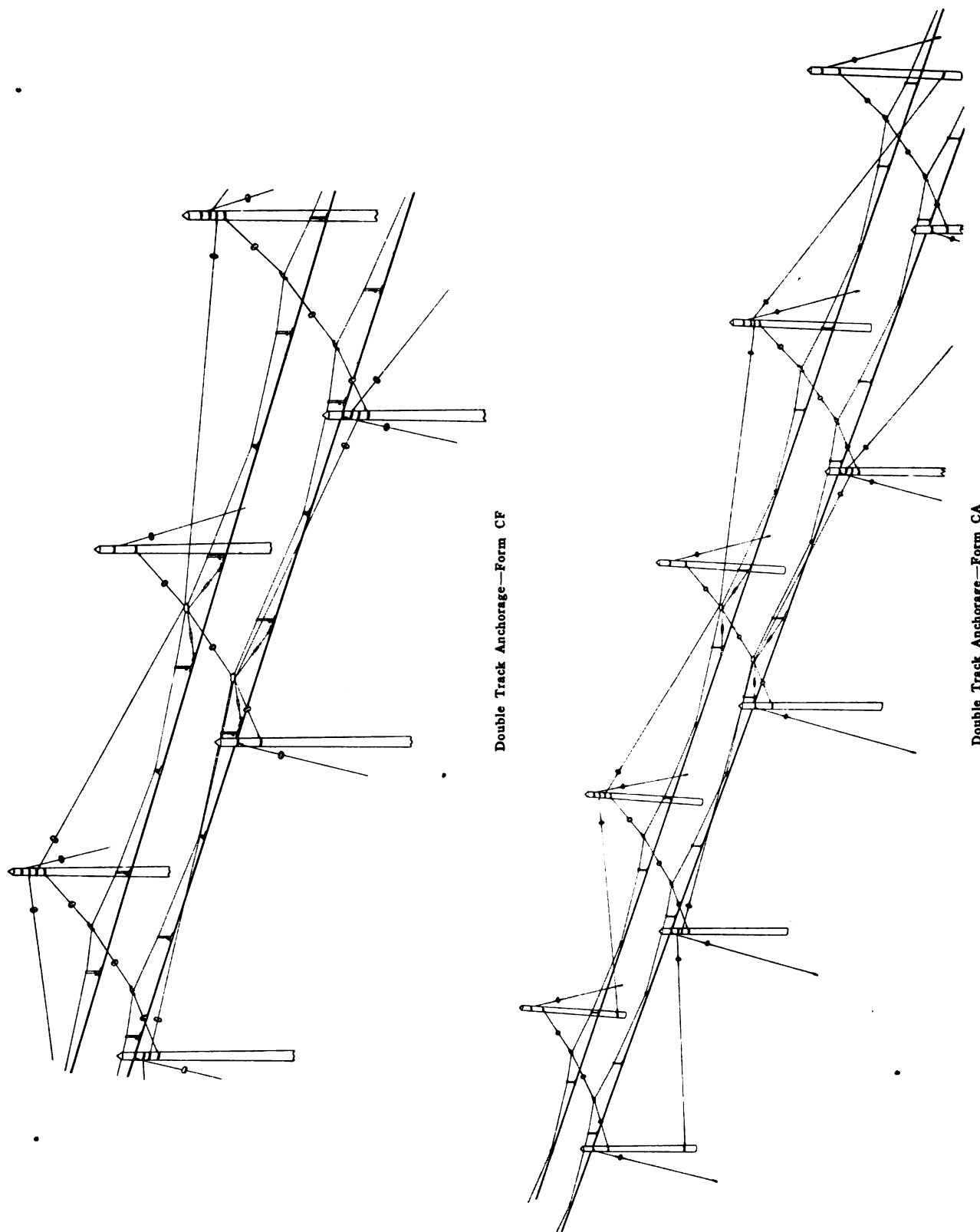


Single Track Anchorage—Form CP

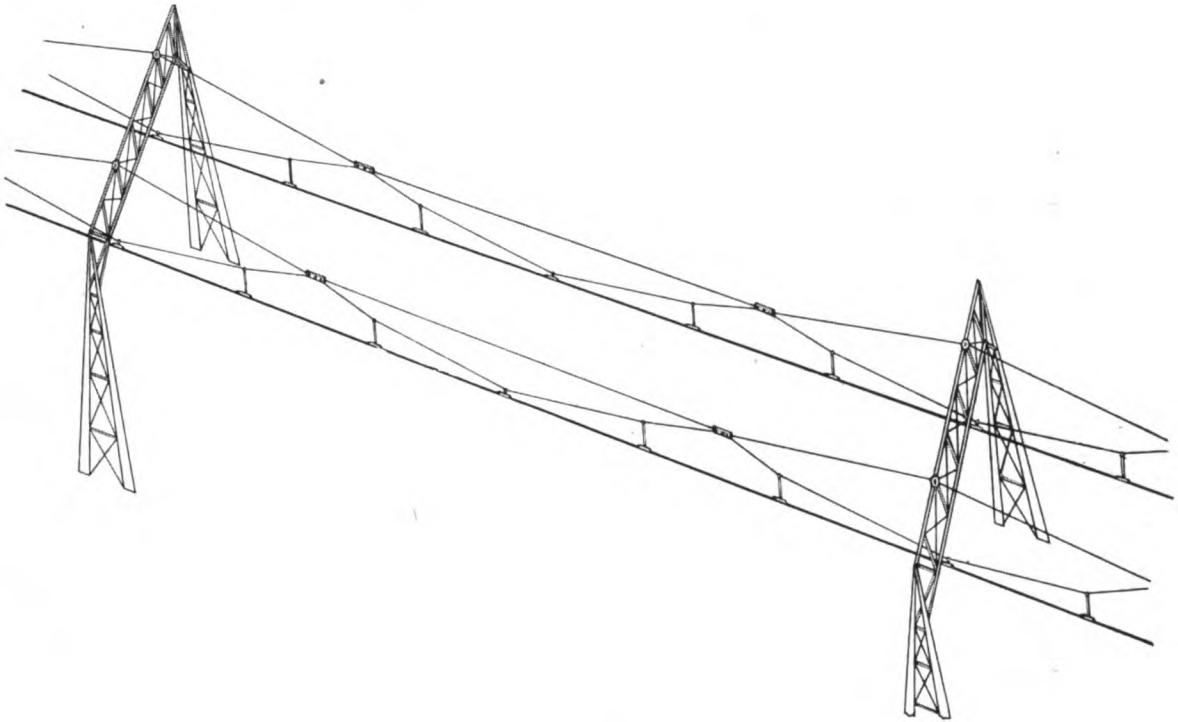


Single Track Anchorage—Form CA

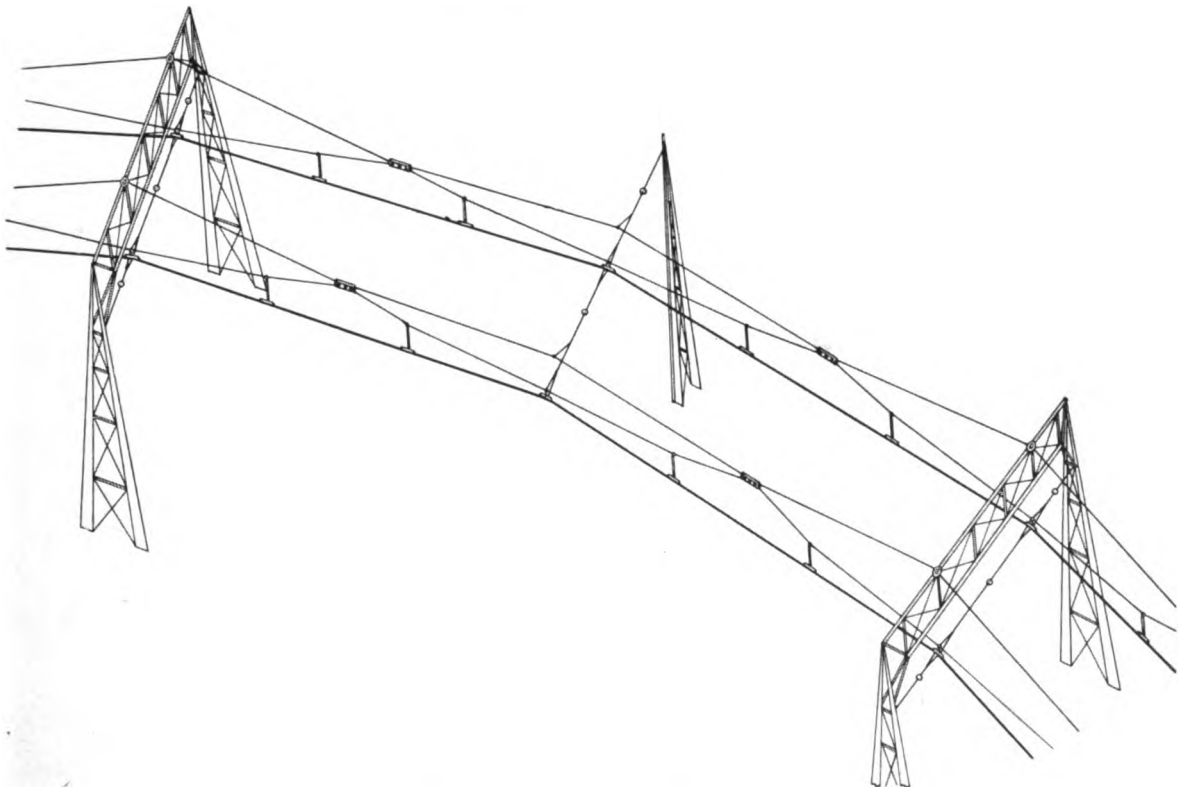
LINE MATERIAL FOR CATENARY CONSTRUCTION



LINE MATERIAL FOR CATENARY CONSTRUCTION

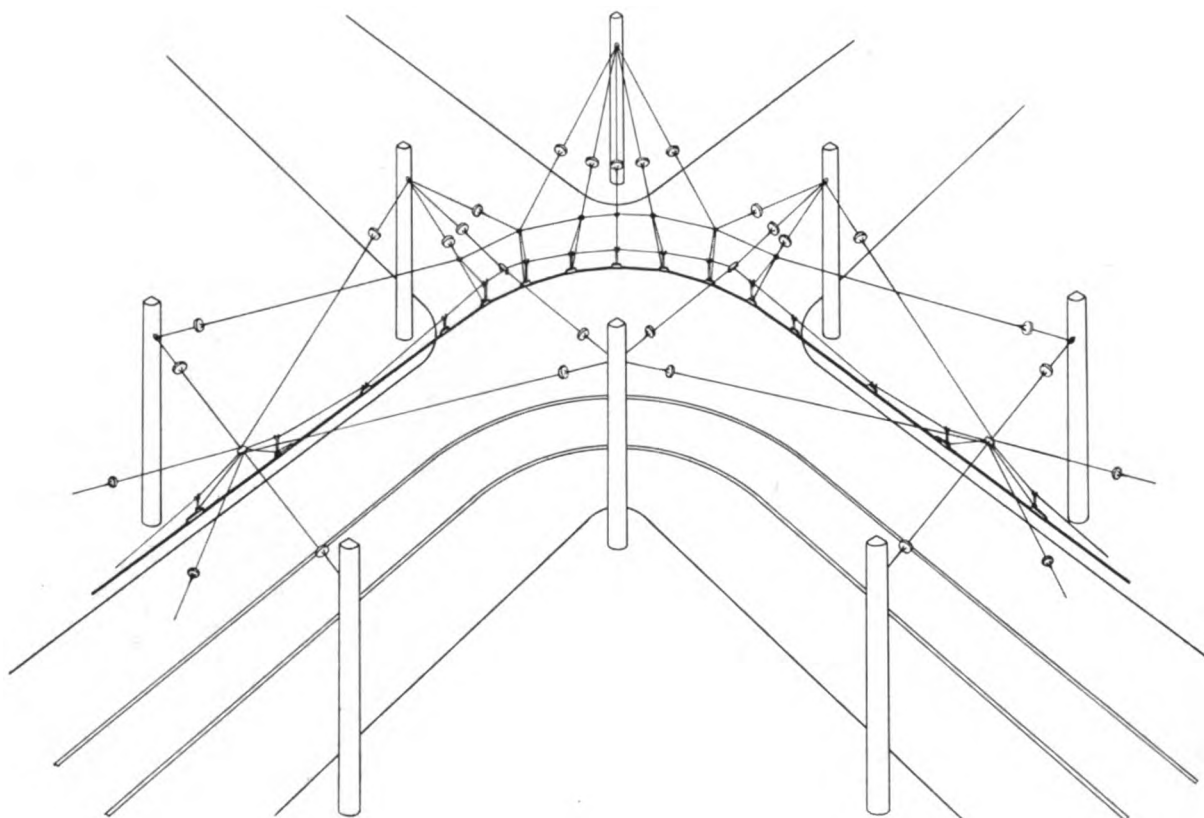


Double Track Tangent—Bridge Construction

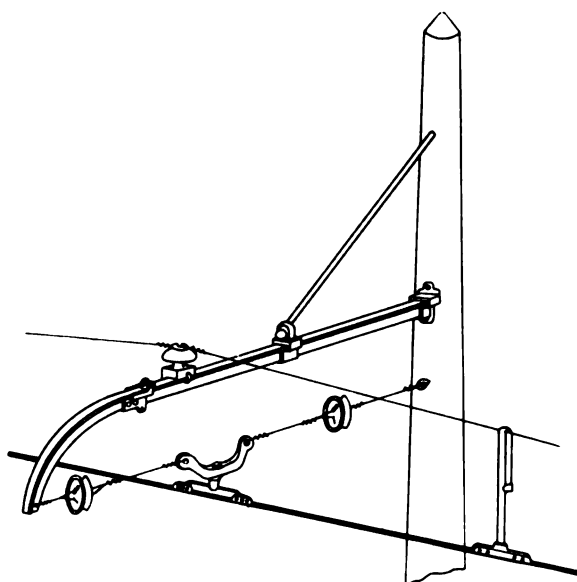


Double Track Curve—Bridge Construction

LINE MATERIAL FOR CATENARY CONSTRUCTION



Single Track—Street Corner



Trolley Wire Steady—Bracket Construction

A detailed line drawing of a mechanical device, likely a crane or hoist, featuring a vertical post, a horizontal beam, and various pulleys and cables. The device is shown in a side profile, with a vertical post supporting a horizontal beam. A cable runs from the top of the post, through a pulley, and then down to a hook. Another cable runs from the bottom of the post, through a pulley, and then up to a hook. The drawing is a technical illustration, showing the components and their arrangement.

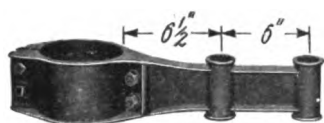
A technical line drawing of a mechanical system, possibly a cable-stayed bridge or a similar structure. The drawing shows a cable running from a vertical support on the left to a horizontal support on the right. The cable is anchored to the left support and passes over a pulley system on the right. A coiled section of the cable is shown in the middle, with a label '52.22' next to it. The drawing is a black and white line drawing with no shading.

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CROSS ARMS

MALLEABLE IRON—FEEDER

These arms as listed are suitable for Standard Pipe Poles of various diameters. It should be noted that the diameters given are "pipe measurements." The actual outside diameters, corresponding to the nominal diameters are given in the note below. The diameter of the insulator pin holes is $1\frac{9}{16}$ in.



2-Pin Single Arm



4-Pin Double Feeder Arm

DOUBLE

2-PIN

Cat. No.	Description	Approx. Weight per 100
40113	For 4" standard pipe pole	1300
40114	For 5" standard pipe pole	1450
40115	For 6" standard pipe pole	1600
40116	For 7" standard pipe pole	1700

4-PIN

40117	For 4" standard pipe pole	1700
40118	For 5" standard pipe pole	1900
40119	For 6" standard pipe pole	2000
40120	For 7" standard pipe pole	2200

6-PIN

40121	For 4" standard pipe pole	2200
40122	For 5" standard pipe pole	2400
40123	For 6" standard pipe pole	2500
40124	For 7" standard pipe pole	2700

SINGLE

1-PIN

Cat. No.	Description	Approx. Weight per 100
40137	For 4" standard pipe pole	950
40138	For 5" standard pipe pole	1100
40139	For 6" standard pipe pole	1200
40140	For 7" standard pipe pole	1300

2-PIN

40141	For 4" standard pipe pole	1250
40142	For 5" standard pipe pole	1400
40143	For 6" standard pipe pole	1500
40144	For 7" standard pipe pole	1600

CROSS ARMS**MALLEABLE IRON—FEEDER—SINGLE (Concluded)****3-PIN**

Cat. No.	Description	Approx. Weight per 100
40145	For 4" standard pipe pole	1475
40146	For 5" standard pipe pole	1600
40147	For 6" standard pipe pole	1700
40148	For 7" standard pipe pole	1800

NOTE.—Actual outside diam. of 4 in. Standard Pipe Pole, $4\frac{1}{2}$ in.
 Actual outside diam. of 5 in. Standard Pipe Pole, $5\frac{1}{8}$ in.
 Actual outside diam. of 6 in. Standard Pipe Pole, $6\frac{3}{8}$ in.
 Actual outside diam. of 7 in. Standard Pipe Pole, $7\frac{1}{2}$ in.

WOOD CROSS ARMS

The wood cross arms are furnished in yellow pine—painted two coats. The low tension feeder and the high tension arms are bored for $1\frac{1}{2}$ in. pins and two $\frac{1}{2}$ in. lag screws. The telephone arms are bored for $1\frac{1}{4}$ in. pins and two $\frac{1}{2}$ in. lag screws. Arms with other boring will be furnished to order.

LOW TENSION FEEDER—CROSS SECTION $3\frac{1}{4}$ IN. x $4\frac{1}{4}$ IN.

Cat. No.	No. of Pins	Length in In.	SPACING IN INCHES			Approx. Weight per 100
			Ends	Center	Sides	
40179	2	36	4	28		100
40180	4	48	4	16	12	140
40181	4	60	4	18	17	170
40182	4	72	4	24	20	210
40183	6	72	4	16	12	210

HIGH TENSION—CROSS SECTION 4 IN. x 5 IN.

100000	2	36	4	28		150
100001	2	48	4	40		210
100002	4	60	4	18	17	250
100003	4	72	4	22	21	310
100004	4	96	4	32	28	430
100005	6	96	4	20	17	430
100006	6	120	4	28	21	550

TELEPHONE—CROSS SECTION $2\frac{3}{4}$ IN. x $3\frac{3}{4}$ IN.

100007	2	24	3	18		50
100008	2	30	3	24		70
100009	4	42	3	16	10	95
100010	6	62	3	16	10	140
100011	8	82	3	16	10	180
100012	10	102	3	16	10	235
100013	4	48	3	16	13	110
100014	6	72	3	16	12 $\frac{1}{2}$	165
100015	8	96	3	16	12 $\frac{1}{2}$	220
100016	12	120	3	14	10	275

CROSS ARM BRACES

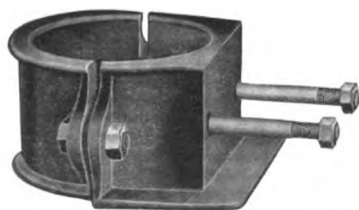


Diameter of hole at pole end $\frac{1}{8}$ in; at cross arm end $\frac{7}{16}$ in.

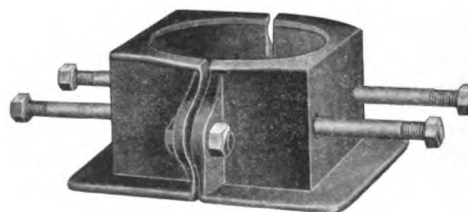
Cat. No.	Description	Approx. Weight per 100
40184	20" x 1 $\frac{1}{2}$ " x 1", plain	180
40185	20" x 1 $\frac{1}{2}$ " x 1", galvanized	180
40186	24" x 1 $\frac{1}{2}$ " x 1", plain	215
40187	24" x 1 $\frac{1}{2}$ " x 1", galvanized	215
40188	28" x 1 $\frac{1}{2}$ " x 1", plain	250
40189	28" x 1 $\frac{1}{2}$ " x 1", galvanized	250
40190	20" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", plain	160
40191	20" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", galvanized	160
40192	24" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", plain	190
40193	24" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", galvanized	190
40194	28" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", plain	220
40195	28" x 1 $\frac{3}{4}$ " x $\frac{3}{4}$ ", galvanized	220
100017	20" x 1" x $\frac{1}{8}$ ", plain	110
100018	20" x 1" x $\frac{1}{8}$ ", galvanized	110
100019	24" x 1" x $\frac{1}{8}$ ", plain	125
100020	24" x 1" x $\frac{1}{8}$ ", galvanized	125
100021	28" x 1" x $\frac{1}{8}$ ", plain	140
100022	28" x 1" x $\frac{1}{8}$ ", galvanized	140

CROSS ARM CLAMPS

FOR FASTENING WOOD CROSS ARMS TO IRON POLES



Cat. No. 40162



Cat. No. 40166

CAT. NO.		Dia. of Pole	APPROX. WEIGHT PER 100	
Single Cross Arm	Double Cross Arm		Single	Double
40161	40165	4"	675	850
40162	40166	5"	925	1150
40163	40167	6"	1050	1325
40164	40168	7"	1150	1450

BOLTS, NUTS AND WASHERS
CROSS ARM BOLTS
FOR FASTENING WOOD CROSS ARMS TO WOOD POLES



CAT. NO.		Length	Diameter	Approx. Weight per 100
Plain	Galvanized			
100097	100103	10"	1 1/2"	65
100098	100104	12"	1 3/4"	75
100099	100105	14"	1 7/8"	85
100100	100106	16"	2"	95
100101	100107	18"	2 1/8"	105
100102	100108	20"	2 1/4"	115
42427	42433	10"	1 1/2"	100
42428	42434	12"	1 3/4"	125
42429	42435	14"	1 7/8"	140
42430	42436	16"	2"	155
42431	42437	18"	2 1/8"	175
42432	42438	20"	2 1/4"	190

The above Catalogue Numbers cover bolts with nuts but without washers.

WELDED STEEL EYE BOLTS



		Length	Diameter	Approx. Weight per 100
Plain	Galvanized			
40210	40220	6"	1 1/2"	60
40211	40221	10"	1 3/4"	80
40212	40222	12"	1 7/8"	95
40213	40223	14"	2"	105
43684	43686	16"	2 1/8"	120
40214	40224	10"	1 3/4"	130
40215	40225	12"	1 7/8"	150
40216	40226	14"	2"	170
43685	43687	16"	2 1/8"	190
40217	40227	12"	1 7/8"	235
40218	40228	14"	2"	260
40219	40229	16"	2 1/8"	285

The above Catalogue Numbers cover bolts with nuts and washers.

DROP FORGED STEEL EYE BOLTS



CAT. NO.		Length	DIAMETER		Approx. Weight per 100
Plain	Galvanized		Stock	Eye	
40798	40780	6"	1 1/2"	1 1/2"	60
40799	40781	8"	1 3/4"	1 3/4"	70
64544	40782	10"	1 7/8"	1 7/8"	80
40230	40232	12"	2"	2"	95
64545	40783	14"	2 1/8"	2 1/8"	105
64546	40784	16"	2 1/4"	2 1/4"	120
64548	40786	6"	1 1/2"	1 1/2"	90
64549	40787	8"	1 3/4"	1 3/4"	110
64550	40788	10"	1 7/8"	1 7/8"	130
40231	40233	12"	2"	2"	150

The above Catalogue Numbers cover bolts with nuts and washers.
The bolts are threaded four inches.
Variations in length can be furnished at corresponding prices.

BOLTS, NUTS AND WASHERS

DROP FORGED STEEL EYE BOLTS—(Concluded)

CAT. NO.		Length	DIAMETER		Approx. Weight per 100
Plain	Galvanized		Stock	Eye	
64551	40789	14"	1"	3"	170
64552	48837	16"	1"	3"	190
64553	40791	18"	1"	3"	210
64555	40793	10"	1"	1"	210
64556	40794	12"	1"	1"	235
64557	40795	16"	1"	1"	285
64558	40796	18"	1"	1"	310
64559	40797	20"	1"	1"	335

The above Catalogue Numbers cover bolt with nuts and washers.
The bolts are threaded four inches.
Variations in length can be furnished at corresponding prices.

FORK BOLTS



Cat. No.	Description	Approx. Weight per 100
19464	Fork bolt with porcelain insulator, 12" x 5/8"	195
43683	Fork bolt with porcelain insulator, 14" x 5/8"	360

The above Catalogue Numbers cover bolts with nut but no washer.

CARRIAGE BOLTS

Length of thread is about three times the diameter.

PRICE PER HUNDRED

Length in Inches	DIAMETER			
	1"	1 1/4"	1 1/2"	1 3/4"
1 1/2	\$1.00	\$1.90	...	...
1 3/4	1.04	1.98	...	...
2	1.08	2.06	...	...
2 1/4	1.16	2.22	\$3.00	\$5.20
3	1.24	2.38	3.22	5.54
3 1/4	1.32	2.54	3.44	5.88
4	1.40	2.70	3.66	6.22
4 1/4	1.48	2.86	3.88	6.56
5	1.56	3.02	4.10	6.90
6	1.72	3.34	4.54	7.58
7	1.88	3.66	4.98	8.26
8	2.04	3.98	5.42	8.94
9	2.20	4.30	5.86	9.62
10	2.36	4.62	6.30	10.30
11	2.52	4.94	6.74	10.98
12	2.68	5.26	7.18	11.66

Prices on galvanized bolts will be quoted on application.

WEIGHT IN LBS. PER HUNDRED

Length in Inches	DIAMETER				Length in Inches	DIAMETER			
	1"	1 1/4"	1 1/2"	1 3/4"		1"	1 1/4"	1 1/2"	1 3/4"
1 1/2	3.2	8.9	17.4	32.	5	7.6	19.1	35.5	60.4
1 3/4	3.7	9.	18.6	34.	6	8.9	22.	40.6	68.4
2	3.9	10.3	20.	36.4	7	10.2	24.9	45.8	76.4
2 1/4	4.5	11.8	22.6	40.4	8	11.4	27.8	50.9	84.4
3	5.1	13.2	25.1	44.4	9		30.8	56.1	92.4
3 1/4	5.8	14.7	27.7	48.4	10		33.7	61.3	101.
4	6.4	16.2	30.3	52.4	11		34.8	66.4	109.
4 1/4	7.	17.6	32.9	56.4	12		37.5	71.6	117.

BOLTS, NUTS AND WASHERS**STANDARD MACHINE BOLTS**

The prices given below apply to bolts with Square Heads and Nuts. For Hexagonal Nuts add 10 per cent. For Hexagonal Heads and Nuts add 20 per cent.

PRICE PER HUNDRED

Length In Inches	DIAMETER						
	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/2"	3"
1 1/2	\$1.70	\$2.00	\$2.40	\$2.80	\$3.60	\$5.20	\$7.20
2	1.78	2.12	2.56	3.00	3.86	5.58	7.70
2 1/2	1.86	2.24	2.72	3.20	4.12	5.96	8.20
3	1.94	2.36	2.88	3.40	4.38	6.34	8.70
3 1/2	2.02	2.48	3.04	3.60	4.64	6.72	9.20
4	2.10	2.60	3.20	3.80	4.90	7.10	9.70
4 1/2	2.18	2.72	3.36	4.00	5.16	7.48	10.20
5	2.26	2.84	3.52	4.20	5.42	7.86	10.70
5 1/2	2.34	2.96	3.68	4.40	5.68	8.24	11.20
6	2.42	3.08	3.84	4.60	5.94	8.62	11.70
6 1/2	2.50	3.20	4.00	4.80	6.20	9.00	12.20
7	2.58	3.32	4.16	5.00	6.46	9.38	12.70
7 1/2	2.66	3.44	4.32	5.20	6.72	9.76	13.20
8	2.74	3.56	4.48	5.40	6.98	10.14	13.70
9	2.90	3.80	4.80	5.80	7.50	10.90	14.70
10	3.06	4.04	5.12	6.20	8.02	11.66	15.70
11	3.22	4.28	5.44	6.60	8.54	12.42	16.70
12	3.38	4.52	5.76	7.00	9.06	13.18	17.70
13			6.08	7.40	9.58	13.94	18.70
14			6.40	7.80	10.10	14.70	19.70
15			6.72	8.20	10.62	15.46	20.70
16			7.04	8.60	11.14	16.22	21.70
17					11.66	16.98	22.70
18					12.18	17.74	23.70
19					12.70	18.50	24.70
20					13.22	19.26	25.70

Length of thread is about three times the diameter of bolt head. Bolts with longer thread furnished to order. Prices on galvanized bolts will be quoted on application.

AVERAGE WEIGHT PER HUNDRED INCLUDING NUTS

Length In Inches	DIAMETER							
	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/2"	3"	3 1/2"
1 1/2	3.9 lbs.	6.2 lbs.	9.7 lbs.	14.7 lbs.	20.4 lbs.	26. lbs.	37. lbs.	58. lbs.
2	4.6	7.2	11.3	16.5	22.4	29.	39.9	63.2
2 1/2	5.4	8.2	12.9	18.5	25.	32.2	44.1	69.
3	6.2	9.3	14.5	20.5	27.8	35.4	48.3	75.2
3 1/2	6.9	10.4	16.1	22.6	30.6	38.7	52.5	81.4
4	7.6	11.5	17.7	24.7	33.4	42.	56.7	87.6
4 1/2	8.3	12.6	19.2	26.8	36.2	45.3	60.9	93.8
5	9.	13.7	20.7	28.9	39.	48.6	65.1	100.
5 1/2	9.7	14.8	22.2	31.	41.8	51.9	69.2	106.
6	10.4	15.9	23.7	33.1	44.6	55.2	73.4	112.
6 1/2	11.1	17.	25.2	35.2	47.4	58.5	77.6	118.5
7	11.8	18.1	26.7	37.3	50.2	61.8	81.8	124.5
7 1/2	12.5	19.2	28.2	39.4	53.1	65.1	86.	130.5
8	13.2	20.3	29.7	41.5	56.	68.5	90.	136.5
9			33.1	45.7	61.5	75.2	98.	149.
10			36.5	49.9	67.	81.9	106.3	161.
11			40.	54.	72.5	88.7	114.6	173.
12			43.5	58.3	78.	95.5	122.9	184.5
13			47.	62.5	83.5	102.3	131.2	196.5
14			50.5	66.7	89.	109.1	139.5	209.
15			54.	70.9	94.5	116.	148.	221.
16			57.5	75.1	100.	123.	156.5	233.
17					105.5	130.	165.	245.
18					111.	137.	173.5	257.5
19					116.5	144.	182.	270.
20					122.	151.	190.5	282.

BOLTS, NUTS AND WASHERS**ROUND PLATE WASHERS**

DIMENSIONS IN INCHES		Thickness Wire Gauge	Size of Bolt in Inches	Average Number in 100 Lbs.	List Price per 100 Lbs.
Outside Diam.	Diam. of Hole				
$\frac{3}{4}$	$\frac{1}{8}$	No. 16	$\frac{1}{4}$	13900	\$12.20
$\frac{7}{8}$	$\frac{1}{8}$	No. 16	$\frac{1}{8}$	11250	11.40
1	$\frac{1}{8}$	No. 14	$\frac{1}{4}$	6800	10.50
$1\frac{1}{4}$	$\frac{1}{8}$	No. 14	$\frac{3}{8}$	4300	9.70
$1\frac{1}{2}$	$\frac{1}{8}$	No. 12	$\frac{1}{2}$	2600	9.20
$1\frac{3}{4}$	$\frac{1}{8}$	No. 12	$\frac{5}{8}$	2250	9.10
$2\frac{1}{4}$	$\frac{1}{8}$	No. 10	$\frac{3}{4}$	1300	9.00
2	$\frac{1}{8}$	No. 10	$\frac{7}{8}$	1010	8.80
$2\frac{1}{2}$	$\frac{1}{8}$	No. 9	1	860	8.80
$2\frac{3}{4}$	$1\frac{1}{8}$	No. 9	1	625	8.80

Prices on galvanized round plate washers quoted on application.

SQUARE PLATE WASHERS**NATIONAL LOCK WASHERS**

DIMENSIONS IN INCHES			Approx. Weight per 1000	List Price per 100 Lbs.	Description	List Price per 1000
Width	Thickness	Size Bolt				
2	$\frac{1}{4}$	$\frac{1}{4}$	140	\$9.20	For $\frac{1}{4}$ " Bolt	\$8.25
2	$\frac{3}{8}$	$\frac{1}{2}$ or $\frac{3}{4}$	200	9.00	For $\frac{3}{8}$ " Bolt	9.50
$2\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$ or 1	250	8.80	For $\frac{1}{2}$ " Bolt	9.75
3	$\frac{1}{2}$	1 or $1\frac{1}{4}$	450	8.80	For $\frac{3}{4}$ " Bolt	10.75
4	$\frac{1}{2}$	$1\frac{1}{4}$ or $1\frac{1}{2}$	800	8.80	For 1 " Bolt	12.25
5	$\frac{1}{2}$	$1\frac{1}{2}$ or 1	1250	8.80	For $1\frac{1}{4}$ " Bolt	13.25

Prices on galvanized square washers quoted on application.

GIMLET OR CONE POINT LAG SCREWS**PRICE PER HUNDRED**

Length Under Head in Inches	DIAMETER					
	$\frac{1}{4}$ " and $\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	1"
2	\$2.45	\$2.96	\$3.47	\$4.11	\$6.00	
$2\frac{1}{2}$	2.65	3.22	3.79	4.47	6.50	\$9.20
3	2.85	3.48	4.11	4.83	7.00	9.90
$3\frac{1}{2}$	3.05	3.74	4.43	5.19	7.50	10.60
4	3.25	4.00	4.75	5.55	8.00	11.30
$4\frac{1}{2}$	3.45	4.26	5.07	5.91	8.50	12.00
5	3.65	4.52	5.39	6.27	9.00	12.70
$5\frac{1}{2}$	3.85	4.78	5.71	6.63	9.50	13.40
6	4.05	5.04	6.03	6.99	10.00	14.10
$6\frac{1}{2}$	4.25	5.30	6.35	7.35	10.50	14.80
7	4.45	5.56	6.67	7.71	11.00	15.50
$7\frac{1}{2}$	4.65	5.82	6.99	8.07	11.50	16.20
8	4.85	6.08	7.31	8.43	12.00	16.90
9	5.25	6.60	7.95	9.15	13.00	18.30
10	5.65	7.12	8.59	9.87	14.00	19.70

Prices will be quoted upon application for galvanized lag screws or for larger sizes.

BOLTS, NUTS AND WASHERS—TURNBUCKLES**GIMLET OR CONE POINT LAG SCREWS—(Concluded)****AVERAGE WEIGHT PER HUNDRED**

Length Under Head in Inches	DIAMETER						
	$\frac{1}{8}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "
2	4.8 lbs.	6.7 lbs.	10.3 lbs.	13. lbs.	22.8 lbs.	24. lbs.	
2½	5.6	8.4	11.9	15.6	25.3	27.2	39 lbs.
3	6.5	9.1	13.5	18.2	27.8	30.5	45
3½	7.3	10.6	15.1	20.6	30.4	33.7	51
4	8.2	12.	16.7	22.9	33.	37.	57
4½	9.	13.	18.6	25.2	35.5	40.2	62
5	9.9	14.	20.5	27.5	38.	43.5	67
5½	10.8	15.	22.4	30.3	40.7	47.	72
6	11.7	16.	24.2	32.	43.3	50.6	77
7			28.	36.5	50.	57.8	87
8				41.	56.8	64.7	97
9				45.5	63.5	72.	107
10				50.	70.3	79.2	117

TURNBUCKLES**DROP FORGED STEEL****WITH TWO EYES**

Cat. No. 40237

Plain	Galvanized	Description	Approx. Weight per 100
40236	40240	$\frac{1}{8}$ " bolts, 4" opening	75
40237	40241	$\frac{1}{4}$ " bolts, 6" opening	160
40238	40242	$\frac{3}{8}$ " bolts, 9" opening	190
40239	40243	$\frac{1}{2}$ " bolts, 12" opening	395

WITH EYE AND HOOK

Cat. No. 40245

40244	40248	$\frac{1}{8}$ " bolts, 4" opening	75
40245	40249	$\frac{1}{4}$ " bolts, 6" opening	170
40246	40250	$\frac{3}{8}$ " bolts, 9" opening	215
40247	40251	$\frac{1}{2}$ " bolts, 12" opening	400

INSULATOR PINS

ALL WOOD PINS



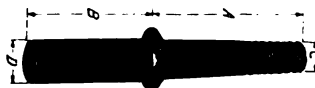
Cat. No.	Description	DIMENSIONS				Approx. Weight per 100
		A	B	C	D	
100023	Oak pin, painted	4	4	1	1½	45
100024	Oak pin, unpainted	4	4	1	1½	40
100025	Locust pin, unpainted	4	4	1	1½	35
8749	Oak pin, painted	4½	4½	1	1½	50
8750	Oak pin, unpainted	4½	4½	1	1½	45
8751	Locust pin, unpainted	4½	4½	1	1½	40
100026	Oak pin, painted	4½	4½	1½	1½	55
100027	Oak pin, unpainted	4½	4½	1½	1½	50
100028	Locust pin, unpainted	4½	4½	1½	1½	45
40252	Locust pin, unpainted (special for Trans. Insulators)	5½	4½	1	1½	50

WOOD SIDE BRACKETS



Cat. No.	Description	Approx. Weight per 100
7798	Oak bracket, painted, 12" long	80
8747	Oak bracket, unpainted, 12" long	75
8841	Locust bracket, unpainted, 12" long	70

IRON PINS



Cat. No.	Description	DIMENSIONS				Approx. Weight per 100
		A	B	C	D	
69066	Malleable iron pin	5½	4	1	1½	350
69067	Grey iron pin	5½	4	1	1½	325
69068	Malleable iron pin	5½	4	1½	1½	400
69069	Grey iron pin	5½	4	1½	1½	375

IRON BRACKETS



Cat. No. 8744



Cat. No. 40201



Cat. No. 17194

Of these brackets, Cat. No. 8744 is intended for light feeder wires. Cat. No. 40201 is a heavier bracket with curved back for pole use, and will carry the largest size feeder. Cat. Nos. 17194 and 60669 are extra heavy and made of gray iron.

INSULATOR PINS

IRON BRACKETS—(Concluded)

Cat. No.	Description	Approx. Weight per 100
8744	Side bracket, 1" thread	85
40201	Side bracket, curved back, heavy 1" thread	290
17194	Side bracket, extra heavy, 1" thread	710
60669	Side bracket, extra heavy 1½" thread	800

STEEL PINS WITH WOOD TOPS



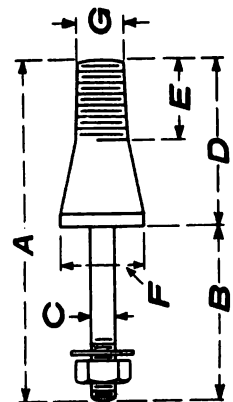
These pins consist of high carbon steel bolts with paraffined wood tops having 1 in. or 1½ in. thread.

Prices include nut and washer.

Cat. No.	DIMENSIONS IN INCHES							Approx. Weight per 100
	A	B	C	D	E	F	G	
40258	9	5	4½	4	1½	2½	1½	110
40259	10½	6	5½	4½	2	2½	1½	125
40260	9½	5	4½	4	2	1½	1	60
40261	8½	5	3½	3½	1½	1½	1	60
40262	10½	5½	4½	5½	2½	2½	1	80

Cat. No.
40260

For pins having other dimensions than given above, or for pins with galvanized bolts, prices will be quoted on application.



STEEL PINS WITH PORCELAIN AND WOOD TOPS

These pins are built with a steel bolt the total length of the pin. The threaded portion is paraffined wood, and is supported on a porcelain base; the porcelain serves to prevent burning of the pin, due to arcing around the skirt of the insulator.

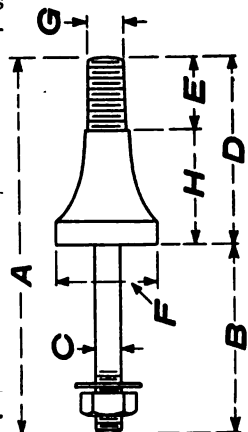
Prices include nut and washer.



Cat. No.	DIMENSIONS IN INCHES								Approx. Weight per 100
	A	B	C	D	E	F	G	H	
40263	9½	4½	1½	4½	1½	2½	1	3	110
40264	10½	4½	1½	5½	2½	2½	1	3	125
40265	8½	4½	1½	4	1½	2½	1	2½	90
40266	10½	6	1½	4½	2½	2½	1½	2½	155
40267	11	5½	1½	5½	2½	3	1½	3½	155
40268	11	5½	1½	5½	2½	3	1½	3	200
40269	11	5½	1½	5½	2½	2½	1½	3	125
40270	12½	5½	1½	7	3½	3	1½	3½	225

Cat. No.
40269

For pins having other dimensions than given above, or for pins with galvanized bolts, prices will be quoted on application.



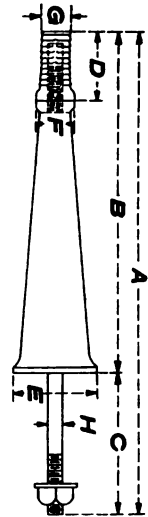
INSULATOR PINS

STANDARD "LEE" PINS—ALL METAL

The "Lee" pin consists of a hollow iron base, a separable iron thimble and a steel stud bolt with nut and washer. The thimble is designed for cementing into the insulator and because of the separable feature the cementing may be done at whatever place is most convenient without causing difficulty in shipping. This renders unnecessary the expensive practice of cementing in the field.

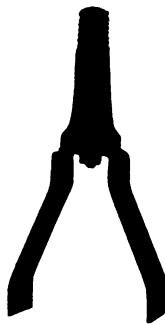
Cat. No.	DIMENSIONS IN INCHES								Approx. Weight per 100
	A	B	C	D	E	F	G	H	
100165	13 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{7}{8}$	3	3	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	450
100166	14	7 $\frac{1}{2}$	6 $\frac{3}{4}$	3	3	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	490
100167	15 $\frac{1}{2}$	9	6 $\frac{7}{8}$	3	3 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	550
100168	17	11	6 $\frac{7}{8}$	3	3 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	655
100169	19	12 $\frac{1}{2}$	6 $\frac{7}{8}$	3	3 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	725
100170	20 $\frac{1}{2}$	14	6 $\frac{7}{8}$	3	4 $\frac{1}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	3 $\frac{1}{4}$	820

Pins with other lengths of stud bolts or with extended pin base can be furnished if specifically ordered.



RIDGE IRONS

These irons are arranged for attachment to the top of wood poles with $\frac{3}{8}$ in. lag screws. The irons are galvanized.



Cat. No. 40203



Cat. No. 40204

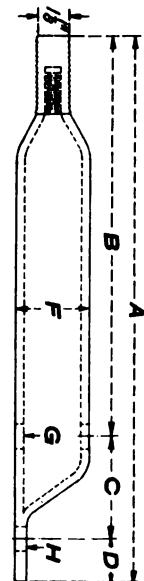
Cat. No.	Description	DIMENSIONS IN INCHES				Approx. Weight per 100
		Height Overall	Height of Iron	Between Legs	Size Iron	
40203	Ridge Iron, with wood pin and porcelain pin base	11 $\frac{3}{4}$	7	6	$\frac{1}{2}$ x 2 $\frac{1}{2}$	275
40204	Ridge Iron, with all wood pin	11 $\frac{1}{2}$	7	6	$\frac{1}{2}$ x 2 $\frac{1}{2}$	250

PIPE POLE-TOP PINS

WITH SEPARABLE THIMBLES

Cat. No.	DIMENSIONS IN INCHES							Approx. Weight per 100
	A	B	C	D	F*	G	H	
100171	13	8 $\frac{1}{2}$	3 $\frac{1}{2}$	1	2	$\frac{1}{2}$	$\frac{1}{2}$	445
100172	15	10	4	1	2	$\frac{1}{2}$	$\frac{1}{2}$	505
100173	17 $\frac{1}{2}$	11 $\frac{1}{2}$	4 $\frac{1}{2}$	1 $\frac{1}{2}$	2	$\frac{1}{2}$	$\frac{1}{2}$	580
100174	20 $\frac{1}{2}$	14	5 $\frac{1}{2}$	1 $\frac{1}{2}$	2	$\frac{1}{2}$	$\frac{1}{2}$	670
100175	23 $\frac{1}{2}$	16	6	1 $\frac{1}{2}$	2	$\frac{1}{2}$	$\frac{1}{2}$	760

*Nominal pipe measurement. The actual diameter is 2.375 in.



INSULATORS**FEEDER TAP****FOR ATTACHING FEEDER TAP TO BRACKET ARM**

For use in pole bracket construction for insulating taps run from the feeder to the trolley wire. Opening in insulating bushings is 1 in.



**Feeder Tap
Insulator**

Cat. No.	Description	Approx. Weight per 100
40207	For 1½" pipe (1.66" outside diam.) mall. iron, galv.	160
40208	For 1½" pipe (1.9" outside diam.) mall. iron, galv.	180
40209	For 2" pipe (2.38" outside diam.) mall. iron, galv.	200

FEEDER WIRE, 600 VOLTS**WITH TOP AND SIDE BEARING**

Cat. No. 64259 is an all compound insulator suitable for feeders up to and including 500,000 c.m. The special compound used will not soften at a temperature less than 650 degrees fahrenheit.



Cat. No. 64259

Cat. No.	Description	Approx. Weight per 100
64259	Insulator with top and side grooves for 4/0 to 500,000 c.m. feeders 1" pin hole	225

TIE TOP**WITH TOP AND SIDE BEARING**

The tie top insulator consists of a sherardized malleable iron shell into which the standard insulating compound is moulded. It is furnished with both 1 in. and 1½ in. pin holes and is suitable for the heaviest loads in all locations excepting corners, for which standard corner insulators are used.



Cat. No. 46012

Cat. No.	Description	Diam. Pin Hole	Approx. Weight per 100
46013	Insulator with top and side grooves for No. 0000 and smaller cond.	1"	415
46012	Insulator with top and side grooves for 500,000 c.m. and smaller cond.	1"	445
46007	Insulator with top and side grooves for No. 0000 and smaller cond.	1½"	410
46006	Insulator with top and side grooves for 500,000 c.m. and smaller cond.	1½"	440
46005	Insulator with top and side grooves for 800,000 c.m. and smaller cond.	1½"	520
46004	Insulator with top and side grooves for 1,500,000 c.m. and smaller cond.	1½"	540

INSULATORS

FEEDER WIRE, 600 VOLTS—CLIP TOP

WITH TOP AND SIDE BEARING

The clip top insulators have sherardized malleable iron shells with the standard moulded compound insulation. They are listed for two sizes of pins and to accommodate cables up to 1,500,000 c.m. cross section. The top clips being well malleablized are readily peened over the feeder to hold it in place. It should be noted particularly that in all the General Electric Company's iron clad insulators, the iron shells extend well below the lowest bearing point of the insulator pins thereby greatly strengthening them against side strains. The clip top insulators are offered for any service excepting at corners, for which standard corner insulators are used.



Cat. No. 46010

Cat. No.	Description	Diam. Pin Hole	Approx. Weight per 100
46011	Insulator with top clips and side groove for No. 0000 and smaller cond.	1"	390
46010	Insulator with top clips and side groove for 500,000 c.m. and smaller cond.	1"	415
46003	Insulator with top clips and side groove for No. 0000 and smaller cond.	1½"	385
46002	Insulator with top clips and side groove for 500,000 c.m. and smaller cond.	1½"	410
46000	Insulator with top clips and side groove for 800,000 c.m. and smaller cond.	1½"	495
46001	Insulator with top clips and side groove for 1,500,000 c.m. and smaller cond.	1½"	520

WEDGE TOP

WITH TOP AND SIDE BEARING

This insulator is like the clip top insulator in general design but the clip tops are replaced by malleable iron clamping wedges, which are free to move up and down the inclined slots but effectually prevented from horizontal movement. This design makes it practically impossible for the feeder to be pulled from the insulator top by side strains. It is furnished with either 1 in. or 1½ in. pin holes and for cables up to and including 1,500,000 c.m. cross section. All metal parts are sherardized.



Cat. No. 61110

Cat. No.	Description	Diam. Pin Hole	Approx. Weight per 100
61110	Insulator with top wedges and side groove for 0000 to 500,000 c.m. cond.	1"	520
61109	Insulator with top wedges and side groove for 0000 to 500,000 c.m. cond.	1½"	515
61108	Insulator with top wedges and side groove for 600,000 to 1,500,000 c.m. cond.	1½"	625

CORNER INSULATOR

WITH SIDE BEARING ONLY

The corner insulator is arranged with side bearing only and designed for use at street corners where the sharpest turns and greatest side strains are met. Like our other metal clad insulators, it is furnished with a sherardized malleable iron shell which extends well below the lowest bearing point of the pin.



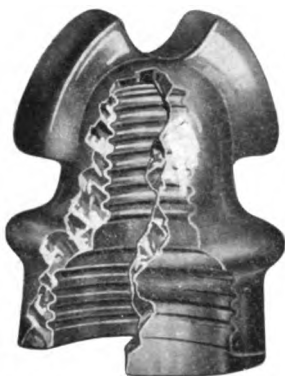
Cat. No. 46006

Cat. No.	Description	Diam. Pin Hole	Approx. Weight per 100
46014	For 0000 to 500,000 c.m. conductor	1"	390
46008	For 0000 to 500,000 c.m. conductor	1½"	385
46009	For 600,000 to 1,500,000 c.m. conductor	1½"	440

INSULATORS

FEEDER WIRE, 600 VOLTS

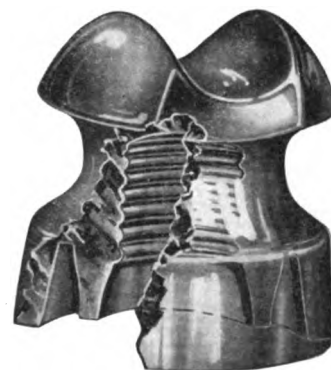
GLASS



Cat. No. 40275



Cat. No. 40276



Cat. No. 40278

Cat. No.	DIMENSIONS IN INCHES					No. per Bbl.	Approx. Weight Each
	Diam.	Height	Top Groove	Side Groove	Pin Hole		
40275	3½	4½	1	⅞	1	110	2½
40276	3½	4	1½	1	1	125	2
*40277	4½	5½	1½	1½	1	50	4
40278	4	4½	1½	1½	1½	75	2½

* Similar in appearance to Cat. No. 40276.

PORCELAIN



Cat. No. 40282



Cat. No. 40279



Cat. No. 40280

40279	3½	3	1½	⅞	1	200	1½
40280	3½	4½	1½	⅞	1	200	1½
40282	4½	4½	1½	1½	1½	100	2½

INSULATORS

FOR TELEPHONE, TELEGRAPH, SIGNAL WORK, ETC.

GLASS



Cat. No. 9322



Cat. No. 40271



Cat. No. 9312

Cat. No.	Description	DIMENSIONS IN INCHES					Working Voltage	No. per Bbl.	Approx. Weight Each
		Diam.	Height	Top Groove	Side Groove	Pin Hole			
9322	Standard pony glass	2½	3½		¾	1		400	1½
9312	Standard pony glass, double petticoat	2½	3½		¾	1		300	1½
40271	Glass transposition	3¾	4½		¾	1		100	2½

PORCELAIN



Cat. No. 40272



Cat. No. 40273



Cat. No. 40274

40272	Porcelain transposition	3½	4½		¾	1		150	1½
40273	Pony porcelain, deep groove double petticoat	3½	3½		¾	1		200	1½
*40274	Porcelain	3½	3	½	¾	1	6600	200	1½

* For use on telephone circuits where the wires are carried on the same poles with high tension power lines. In such cases the induced potential between the telephone wires and ground often reaches several thousand volts, so that it is necessary in every instance, to suspend both sides of the telephone circuit on high tension insulators.

INSULATORS **FOR ALTERNATING CURRENT WORK** **FOR WORKING VOLTAGES UP TO 3500**



Cat. No. 40283 Glass



Cat. No. 40274 Porcelain



Cat. No. 40284 Glass

Cat. No.	DIMENSIONS IN INCHES					No. per Bbl.	Approx. Wt. Each
	Diam.	Height	Top Groove	Side Groove	Pin Hole		
40283	4 $\frac{1}{2}$	4 $\frac{1}{8}$	None	3 $\frac{3}{8}$	1	125	2 $\frac{1}{4}$
40284	4 $\frac{1}{2}$	3 $\frac{7}{8}$	1	2 $\frac{7}{8}$	1	125	2 $\frac{1}{4}$
40274	3 $\frac{1}{4}$	3	$\frac{1}{2}$	3 $\frac{3}{8}$	1	150	1 $\frac{1}{4}$

FOR WORKING VOLTAGES UP TO 7500



Cat. No. 40285



Cat. No. 40287

Cat. No.	DIMENSIONS IN INCHES					Test Voltage	No. per Bbl.	Approx. Weight in Lbs.
	Diam.	Height	Top Groove	Side Groove	Pin Hole			
40285	4 $\frac{1}{2}$	4 $\frac{1}{8}$	1 $\frac{1}{8}$	1 $\frac{3}{4}$	1	40000	100	2 $\frac{1}{4}$
*40286	5	4 $\frac{1}{8}$	$\frac{3}{4}$	2 $\frac{1}{4}$	1	40000	80	2 $\frac{1}{4}$
40287	5 $\frac{1}{2}$	3 $\frac{1}{2}$	$\frac{3}{4}$	2 $\frac{1}{4}$	1	40000	100	2 $\frac{1}{4}$
†40288	6 $\frac{1}{8}$	4 $\frac{1}{4}$	$\frac{3}{4}$	2 $\frac{1}{4}$	1 $\frac{3}{8}$	50000	50	3

* Similar in appearance to Cat. No. 40285.

† Similar in appearance to Cat. No. 40287.

INSULATORS
FOR ALTERNATING CURRENT WORK
FOR WORKING VOLTAGES UP TO 11000

PORCELAIN



Cat. No. 100156



Cat. No. 100158



Cat. No. 100157

Cat. No.	DIMENSIONS IN INCHES					Test Voltage	No. in Bbl.	Approx Weight Each
	Diam.	Height	Top Groove	Side Groove	Pin Hole			
100156	5 $\frac{3}{4}$	4 $\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$	1 $\frac{1}{8}$	50000	65	3
100158	6 $\frac{3}{4}$	5 $\frac{3}{8}$	1	$\frac{7}{16}$	1 $\frac{1}{8}$	50000	40	4 $\frac{1}{2}$
100157	5 $\frac{1}{2}$	5 $\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	1 $\frac{1}{8}$	50000	50	4 $\frac{1}{2}$

FOR WORKING VOLTAGES UP TO 22000



Cat. No. 100161



Cat. No. 100159



Cat. No. 100160

100161	7 $\frac{1}{4}$	7	1	$\frac{5}{8}$	1 $\frac{3}{8}$	70000	20	8
100159	6 $\frac{3}{4}$	5 $\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{8}$	70000	35	6
100160	7 $\frac{1}{8}$	7	$\frac{1}{4}$	$\frac{1}{4}$	1 $\frac{1}{8}$	70000	26	6

INSULATORS
FOR ALTERNATING CURRENT WORK
FOR WORKING VOLTAGES UP TO 33000

PORCELAIN



Cat. No. 100162



Cat. No. 100163

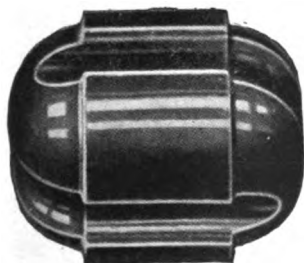


Cat. No. 100164

Cat No.	DIMENSIONS IN INCHES					Test Voltage	No. in Bbl. or Crate	Approx. Ship. Weight Each
	Diam.	Height	Top Groove	Side Groove	Pin Hole			
100162	8	9	3 1/4	3 1/4	1 1/2	86000	15	9 1/2
100164	8 1/2	7 1/2	3 1/4	3 1/4	1 1/2	85000	16	10 1/2
100163	8 1/2	8 1/4	3 1/4	3 1/4	1 1/2	85000	15	11

PORCELAIN STRAIN INSULATOR

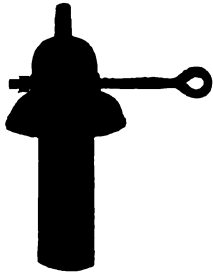
STANDARD PORCELAIN INSULATOR FOR SPAN AND ANCHOR WIRES



Cat. No.	Length	Width	Groove
110900	2 1/4"	2 1/4"	1 1/4"
110901	3 1/4"	2 1/4"	1 1/4"

INSULATED POLE TOPS—CLAMPS—CLIPS FOR IRON POLES

COMPLETE WITH WOOD PLUG, EYEBOLT AND NUT



Cat. No. 66448

Cat. No.	Dia. of Top of Pole	Weight per 100
66448	3"	1500
66450	4"	1600
66452	4½"	1700
66454	5"	2000
66456	6"	3600
66458	7"	3800



Cat. No. 66460

POLE TOPS WITH FEEDER ARMS, COMPLETE WITH WOOD
PLUG, EYEBOLT AND NUT

Cat. No.	Dia. of Top of Pole	Weight per 100
66460	3"	4700
66462	4"	4800
66464	4½"	4900
66466	5"	5000
66468	6"	5900
66470	7"	7000

TROLLEY TERMINAL CLAMP



Cat. No. 27437

Cat. No.	Description	Weight per 100
27437	Terminal clamp for dead ending trolley wires, malleable iron, sherardized	355

SCHAPER GUY WIRE CLAMP



108530	Three bolt clamp for ¾", 7/8" and 1" strand—forged steel galvanized	225
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CROSBY CLIPS



Cat. No. 49211

Cat. No.	Description	Weight per 100
49211	Clip for 1/4" strand	30
49212	Clip for 3/8" strand	37
49213	Clip for 1/2" strand	80

FEEDER CABLE SPLICERS AND CONNECTORS—SECTION SWITCHES

CABLE SPLICER



Cat. No.	Size of Cable	Cat. No.	Size of Cable
43508	250,000 c.m.	43511	500,000 c.m.
43509	300,000 c.m.	43512	750,000 c.m.
43510	400,000 c.m.	43513	1,000,000 c.m.

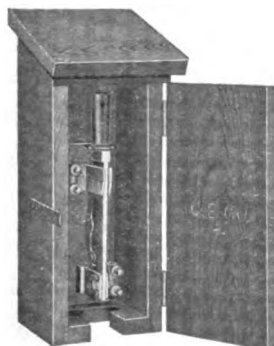
CABLE CONNECTOR



43538	250,000 c.m.	43541	500,000 c.m.
43539	300,000 c.m.	43542	750,000 c.m.
43540	400,000 c.m.	43543	1,000,000 c.m.

SECTION SWITCHES

In these switch boxes, the hinge clip of the switch is connected to the trolley line, and the box is so constructed that the cover can be closed and locked whether the switch is open or closed, thus preventing any interference with the line by unauthorized persons.



Cat. No. 40307
Section Switch

CAT. NO.		Amp. Cap.	WEIGHT EACH	
With Box	Without Box		With Box	Without Box
40305	40313	200	12	5
40307	40315	400	17½	8
*40321		400	32	
40309	40317	600	23	11
40311	40319	1200	46	28

*Has fuse block.



Cat. No. 40321
Section Switch and Fuse

SECTION SWITCHES

AUTOMATIC SECTIONALIZING SWITCH

FOR RAILWAY FEEDER SYSTEMS

The automatic sectionalizing switch herein illustrated and described is designed to improve the efficiency of direct current feeder systems by permitting all section feeders to be placed in multiple. This is accomplished by connecting the switch directly across the section insulators, which, while giving all the advantages of the non-sectionalizing system, does not, in consequence of the automatic operation of the switch, do away with the beneficial results gained from a sectionalized system.

Suppose the trolley or third rail system to be divided into three sections, A, B and C (see connection diagram Fig. 1), and cars become banked during rush hours, etc. in section B, it will be seen that under the general conditions of section feeding the feeders to sections A and C will be idle while the feeder to section B will be insufficient, with a resultant drop in potential and consequent bad operating conditions.

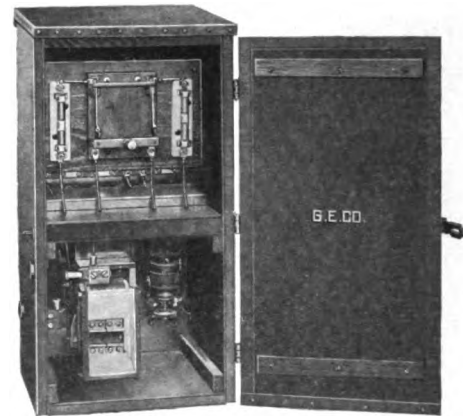
The system, however, can be made continuous and all feeders placed in multiple by the use of the automatic sectionalizing switch, the operation of which is as follows:

* The switch is connected across the section insulator by the taps G and H. Circuit breaker B on being closed energizes section B and current passes through tap G, switch blade Y, contactor operating coil X to contact stud on relay which is open circuited. On closing circuit breaker C, section C is energized, current passes through tap H, switch blade Z, and relay operating coil W to ground, closing the relay disk V. This in turn completes the circuit through the contactor operating coil X, causing the contactor to close and completing the circuit across the insulator, thus placing all feeders in multiple. It will be noted that under these conditions should cars become banked in any one section, current from the other sections will be fed across the section insulators, thus increasing materially the efficiency of the entire copper distribution. The switch will not operate until both breakers, feeding the sections it is connected to, are closed.

In systems where these switches have been installed, exchange current readings taken during rush hours, as high as 600 and 700 amperes have been recorded, with a resultant increase in potential of from 100 to 150 volts.

In cases of short circuits the isolation of the section affected is very simple. A short circuit occurring on section A will, as the system is continuous, cause Breakers A, B and C to drop out and all automatic switches to open circuit. When the station operator closes Breaker A, it will at once open, showing the locality of the trouble. He will next close Breakers B and C, which will energize these sections, causing the automatic switch to close and tying the two sections together.

When the short circuit in section A has been remedied, Breaker A can be closed, automatically tying in section A with the rest of the system.



Automatic Sectionalizing Switch

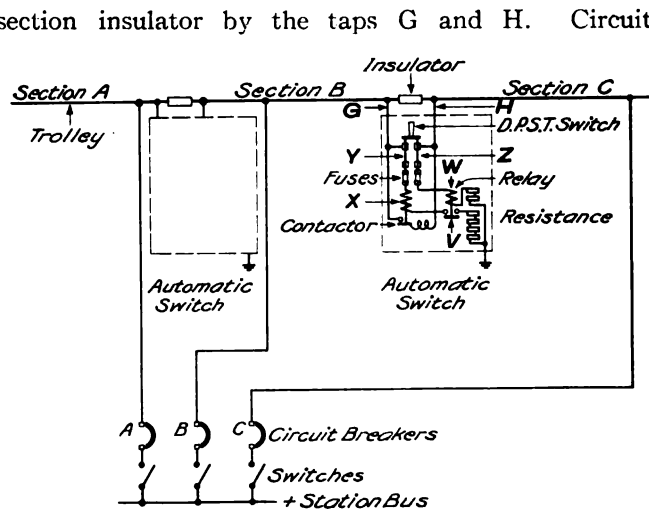


Fig. 1

Connections of Automatic Sectionalizing Switch on
Direct Current Trolley Systems

* The above description holds good for the operation of the switches properly connected between any number of sections, and for making rails continuous between substations. (See Fig. 2.)

SECTION SWITCHES—OVERHEAD LINE TOOLS

AUTOMATIC SECTIONALIZING SWITCH—(Concluded)

FOR RAILWAY FEEDER SYSTEMS

Attention is especially called to the fact that a section cannot be isolated, *i.e.*, both sectionalizing switches will not drop out until the circuit breakers feeding the two adjacent sections and the breaker feeding the section to be isolated have been tripped. After the sectionalizing switches have thus been open-circuited, the breakers feeding the two adjacent sections can be closed.

The sectionalizing switch and box enclosing it are constructed and finished to withstand severest weather conditions. As the location and suspension of the switch depend on local conditions, no brackets are furnished.

This switch is highly recommended to customers wishing to improve their operating conditions without the large outlay for feeder copper generally necessary. Its use is also highly recommended in the original layout of feeder systems since by its adoption a smaller cross-section of feeder copper can be utilized.

DIMENSIONS

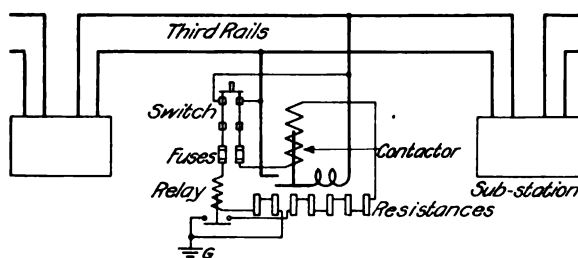
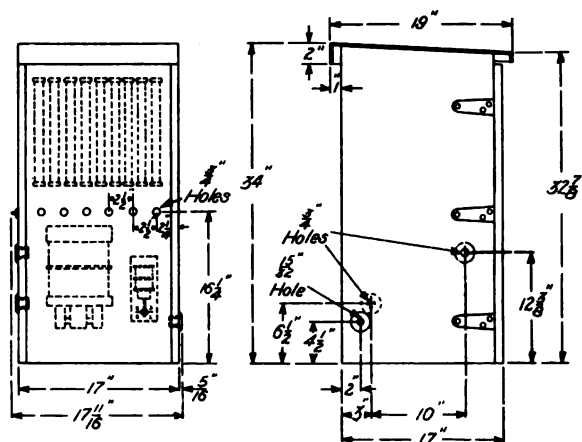


Fig. 2

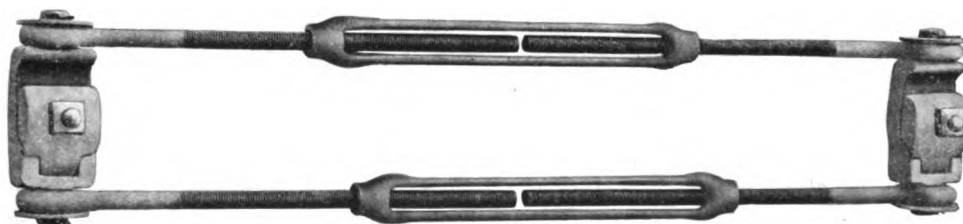
Connections of Automatic Sectionalizing Switch on Direct Current Third Rail Systems—Rails Continuous Between Sub-Stations



Cat. No.	Description	Capacity in Amp.	Total Weight in Lb.
61872	Automatic sectionalizing switch	1000	195

†(Railway Rating)—1000 amperes can be carried 60 per cent. of the time. Continuous capacity is 600 amperes.

OVERHEAD LINE TOOLS



Cat. No. 16914

Cat. No.	Description
16914	Trolley wire tightener, max. length 3' 8 1/4", take up 1'
100031	Trolley wire tightener, max. length 5' 8 1/4", take up 1' 6"

OVERHEAD LINE TOOLS



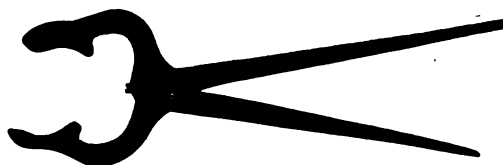
Cat. No. 100029

Cat. No.	Description
100029	Trolley wire tightener, max. length 7' 2", take up 2' 2"
100030	Trolley wire tightener, max. length 10' 2", take up 2' 2"



Cat. No. 16762

16762	Soldering copper for line work, weight 6 lbs.
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Cat. No. 19457

19457	Tongs for tightening cap and cone suspensions
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Cat. No. 35799

35799	Wrench for Form H mining suspensions
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Cat. No. 46765

46765	Wrench for Forms H, D and G, straight line suspensions
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TROLLEY WIRE HAULING CLAMP



Cat. No. 16915

Cat. No.	Description
16915	Trolley wire hauling clamp

OVERHEAD LINE TOOLS—ANCHOR RODS AND ANCHORS

WIRE CABLE THIMBLES



Cat. No.	Dia. of Cable	Approx. Wgt. per 100
88390	$\frac{1}{2}$ "	6
88389	$\frac{3}{4}$ "	7
88388	$\frac{7}{8}$ "	10
88387	1"	14
88386	1 $\frac{1}{8}$ "	18
88385	1 $\frac{3}{8}$ "	25

FEEDER STRAIN CLAMPS



Cat. No.	Description
100077	For No. 0000 cable—M. I. sherardized
100078	For No. 250,000–300,000 c.m. cable—M. I. sherardized
100075	For No. 400,000–650,000 c.m. cable M. I. sherardized
100074	For No. 700,000–1,000,000 c.m. cable—M. I. sherardized

DISTRIBUTING RINGS



100032	2 $\frac{1}{2}$ " x $\frac{1}{4}$ " wrought iron ring	.	.	.	.	.	.	.	.
100033	3" x $\frac{3}{8}$ " wrought iron ring	.	.	.	.	.	.	.	.
100034	4" x $\frac{1}{2}$ " wrought iron ring	.	.	.	.	.	.	.	.

ANCHOR RODS AND ANCHORS

ANCHOR RODS—GALVANIZED



Cat. No. 48838

Cat. No.	Diameter	Length	Approx. Wgt. per 100
100035	$\frac{1}{4}$ "	5'	425
100036	$\frac{3}{8}$ "	6'	500
100037	$\frac{1}{2}$ "	7'	575
100038	$\frac{5}{8}$ "	8'	650
100039	$\frac{3}{4}$ "	5'	650
48838	$\frac{1}{2}$ "	6'	750
100040	$\frac{5}{8}$ "	7'	850
100041	$\frac{3}{4}$ "	8'	950
100042	$\frac{1}{2}$ "	6'	1100
100043	$\frac{5}{8}$ "	7'	1250
100044	$\frac{3}{4}$ "	8'	1400
100045	$\frac{1}{2}$ "	10'	1700
100046	1"	8'	2500
100047	1"	10'	2800
100048	1"	12'	3100

Above Cat. Nos. cover anchor rods with nuts but without washers.

ANCHOR RODS AND ANCHORS

HARPOON ANCHOR



Cat. No.	Diameter	Length	Approx. Wgt. per 100
100049	1"	5 ft.	2200

MATHEWS' GUY ANCHORS

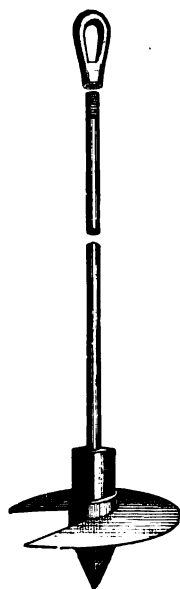


Fig. 3

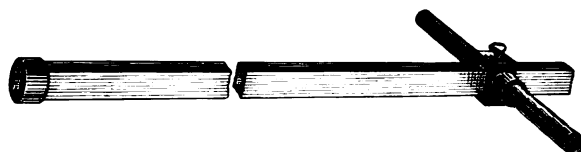


Fig. 1

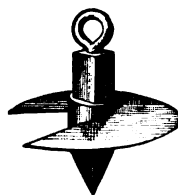


Fig. 2



Fig. 5

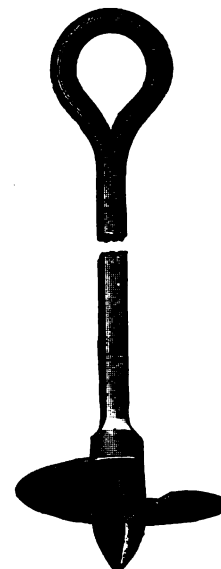
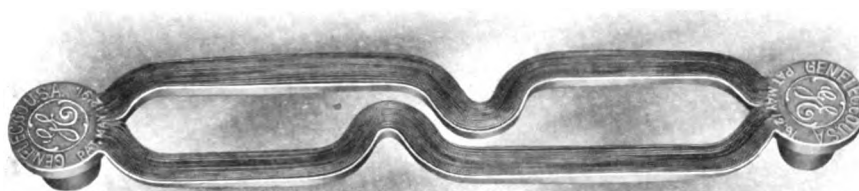


Fig. 4

Cat. No.	Description	Approx. Holding Power in Lbs.	Fig. No.	Approx. Weight per 100
88391	5" Anchor—no rod	12500	2	250
88392	6" Anchor—no rod	15000	2	450
88393	5" Anchor with round rod, $\frac{1}{2}$ " x 6'	12500	3	650
88394	6" Anchor with round rod, $\frac{1}{2}$ " x 6'	15000	3	1000
88395	7" Anchor with round rod, $\frac{1}{2}$ " x 6'	17500	3	1500
88399	Wrench for Cat. Nos. 88391, 88392, 88393 and 88394		1	1800
88418	Wrench for Cat. No. 88395		1	2400
*110706	Ratchet wrench for use with Cat. Nos. 88399 and 88418		5	
88396	8" Anchor with square rod, $1\frac{1}{4}$ " x 6'	20000	4	3800
88397	10" Anchor with square rod, $1\frac{1}{4}$ " x 6'	25000	4	5000
88398	12" Anchor with square rod, $1\frac{1}{4}$ " x 6'	30000	4	8000

*The ratchet wrench used in conjunction with the regular wrench makes it possible to set anchors at acute angles or close to walls, etc.

The anchors listed above are finished plain—prices for similar anchors galvanized furnished on application.

RAIL BONDS

Form A stud terminal rail bond with branched flat wire or ribbon conductors, for use on web of rail under splice bar.



Form B stud terminal rail bond with flat wire or ribbon conductor (unbranched), for use on web of rail under splice bar.



Form C stud terminal rail bond with flat wire conductor, for use on flange or foot of rail.

RAIL BONDS

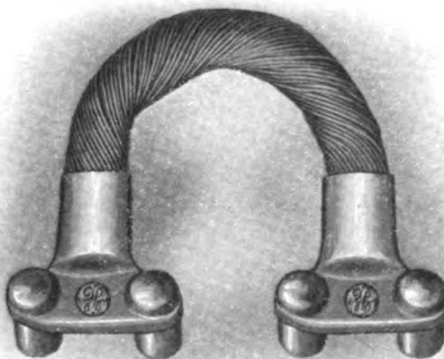


Form D stud terminal rail bond with single cable conductor, for spanning splice bars or cross-bonding. The conductor may pass under splice bar when space permits.

Form E similar to Form D except conductor is of solid wire.



Form F stud terminal bond with branched cable conductor, for use on web of rail under splice bar.



Form M1 twin stud terminal bond with cable conductor, for use on head of rail.

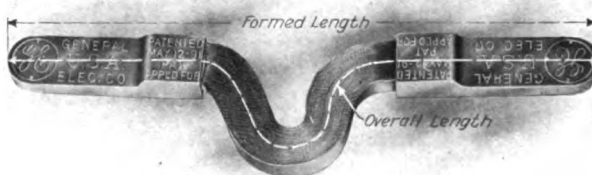
SOLDERED TYPE



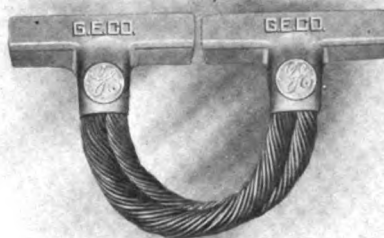
Form AS soldered terminal rail bond with branched flat wire or ribbon conductors, for use on web of rail under splice bar.

RAIL BONDS

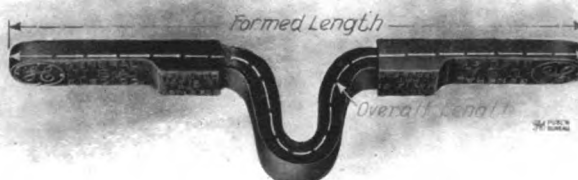
SOLDERED TYPE—(Continued)



Form BS soldered terminal rail bond with flat wire or ribbon conductors, for use on head of rail.

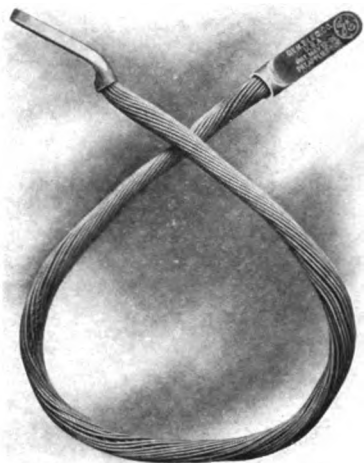


Form GS soldered T shaped terminal bond with cable wire conductor, for use on head of rail.



Form CS soldered terminal rail bond with flat wire or ribbon conductor, for use on flange or foot of rail.

RAIL BONDS



SOLDERED TYPE—(Concluded)

Form DS soldered terminal rail bond with single cable conductor, for spanning splice bar or cross-bonding. The conductor may pass under splice bar when space permits.

SELECTION OF BONDS

The General Electric Company will be glad to submit recommendations and drawings to meet any condition which may be referred to it. Where conditions permit, the compressed terminal bond concealed under the joint plate is to be preferred. Its location on the rail protects it from injury from outside sources and prevents its being stolen. Its construction is such as to make it perfectly adapted to withstand both the vertical and the horizontal movements of the joint. The method of applying compressed terminal bonds calls for the exercise of only ordinary care in drilling the holes and mounting the compressor. The uniformly good results obtained with this bond depend less upon the exercise of personal judgment by the bonding gang than is the case with any other type of bond. Notwithstanding this fact, however, there is a legitimate field for each of the types of bond included in this catalogue.

An attempt to crowd more copper than is recommended under a splice bar will result undoubtedly in the breaking of the conductors. This company recommends, therefore, that customers follow its suggestions and thereby avoid those difficulties which would be encountered by overlooking certain points in selecting and installing rail bonds.

Requests for information in this connection should be accompanied by the following:

- (a) Name of maker and section numbers of rail and joint plate, or a sketch showing section through rail and joint plate.
- (b) If patented joint, name of joint.
- (c) Distance from end of rail to center of first bolt hole, and distance between centers of first and second bolt holes.
- (d) Diameter of joint plate bolts.

The following table gives in circular mils the sectional area of copper equivalent to steel rails of various weights and having various resistance coefficients.

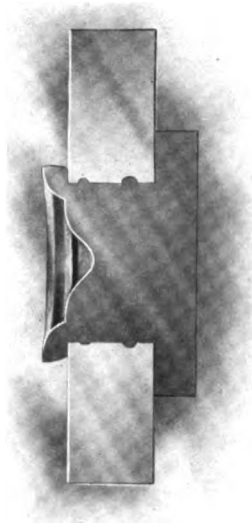
Weight of Rail Lbs. per Yard	RATIO OF RESISTANCE OF STEEL TO RESISTANCE OF COPPER									
	6	7	8	9	10	11	12	13	14	15
	c.m.	c.m.	c.m.	c.m.	c.m.	c.m.	c.m.	c.m.	c.m.	c.m.
50	1061030	909455	795773	707354	636618	578743	530515	489705	454725	424410
60	1273236	1091346	954928	848825	763942	694491	636618	587646	545670	509292
70	1485442	1273237	1114083	990296	891266	810239	742721	685587	636615	594174
75	1591545	1364183	1193660	1061031	954927	868115	795773	734558	682087	636615
80	1697648	1455127	1273238	1131766	1018589	925989	848825	783528	727560	679056
90	1909854	1637018	1432393	1273237	1145913	1041735	954928	881469	818505	763938
100	2122060	1818910	1591546	1414708	1273236	1157486	1061030	979410	909450	848820

The ratio of resistance of steel ordinarily used for track rails (with the present tendency to use steel high in carbon), to the resistance of copper, averages closely 13 to 1. The area of the cross section of a rail is one tenth of its weight in pounds per yard. A 70 pound rail will, therefore, have a sectional area of seven square inches, the equivalent of 685,587 circular mils of copper at the 13 to 1 ratio.

RAIL BONDS

COMPRESSED STUD TERMINAL BONDS

We illustrate in the following pages all of the standard forms of compressed stud terminal bonds. They should be installed with our special, double-screw, or hydraulic compressors.



The accompanying illustration shows in cross section a $\frac{7}{8}$ in. diameter terminal compressed into a $\frac{7}{8}$ in. diameter hole in a piece of steel $\frac{5}{8}$ in. thick, representing the web of a rail. It was compressed with a double-screw compressor, exerting a pressure of 20 tons, operated by one man with the standard 40 in. wrench. Two annular grooves $\frac{1}{8}$ in. wide and $\frac{1}{8}$ in. deep were cut in the walls of the hole, and it will be observed that these grooves became completely filled with copper. This indicates that the studs are soft and malleable, flowing easily and evenly under the pressure of the screw, and that the compressor screw forces the copper back into the hole, entirely filling it before it forms the rivet head over the hole.

APPLICATION OF BONDS

Holes should be drilled with well sharpened tools so that the walls and edges of the hole will be smooth and free from burrs and other irregularities. Bond holes should be of the exact diameter of the bond stud to be inserted.

Oil should not be used in the drilling of holes, as all traces of it cannot readily be removed from the hole, and oil will prevent proper contact between the copper and the steel. A solution of soda and water or plain water may be used, but care should be exercised to see that the hole is wiped perfectly dry before the terminal is inserted. Bonds should not be installed in damp weather. If these simple precautions be disregarded, the electrical efficiency of the bonding will be greatly affected.

If bond holes have been drilled some time prior to the applying of the bonds, the holes should be reamed, as a clean, bright contact is essential.

Rail bond terminals should be rubbed clean and bright with a piece of fine emery cloth before they are inserted in the rail.

Rail bond studs should never be upset with a hammer. Hammering a terminal merely puts a rivet head over the hole, and does not force the copper back into contact with the steel surrounding the hole.

The compression method of installing bonds is admitted generally to be the correct one. After the head of the bond has been drawn up tightly against the web of the rail by the outer screw of our special compressor, the inner screw forces the copper back into the hole. The compressing portion of this inner screw is so designed that a rivet head cannot be formed on the terminal until the hole has been completely filled, even to the pores of the steel. The rivet or button head seals the union, and insures practically a moisture-proof joint. A solution of red lead and linseed oil may be applied to the terminal and adjacent steel, after compression. This will effectually seal the joint against the admission of moisture.

RAIL BONDS

APPLICATION OF BONDS—(Concluded)

To effect radial expansion of the copper in the hole equally in all directions, the inner screw of the bond compressor should be centered in the depression in the end of the terminal.

Bond holes should be located so as to allow for the spacing determined upon between the abutting rail lengths. For instance in single bonding, the holes for a 10 in. bond to be applied to rail lengths spaced $\frac{1}{8}$ in. apart, should be drilled $4\frac{1}{8}$ in. from the end of the rail.

The General Electric Company strongly advises against the locating of bond holes close to the end of the rail. In most cases this sort of drilling provides for a bond too short to embody the necessary flexibility. Moreover it has been found that where the shock caused by the wheels pounding on the joint is dissipated through the copper at the point where it is fixed rigidly to the rail, it has a tendency to shorten the life of the copper.

BONDS WITH OFFSET TUCKING

In most methods of double bonding under the joint plate, the terminals of each bond are applied at unequal distances from the ends of the rails, making it necessary to offset the tucking from the middle of the bond, so as to avoid interfering with the insertion of the joint bolts or the terminals of the other bond. The General Electric Company aims to have the tucking coincide with the spacing between rail ends, and, to accomplish this, must know the exact location of bond holes relatively to the ends of the rails. This information may be conveyed conveniently by a rough pencil sketch showing the side elevation of the rails with the bond drillings indicated.

In order to obtain the double advantage of the mechanical security of the compressed terminal and the efficient electrical contact of a soldered joint, there is an occasional demand for bonds with tinned terminals. Any compressed terminal bond may be furnished with tinned terminals.*

Before installing this style of bond, the rail surrounding the hole should be faced with the special facing tool shown on page 155. The bond hole and spot face should be tinned.

After compression, the terminal of the bond and the surrounding steel are heated, soldering the bond to the rail. The joint should be allowed to cool slowly.

TERMINAL LENGTH

All orders for stud terminal bonds to be applied to the web of the rail, should state either the section number of the rail or the thickness of the web in inches. This information will enable us to ship bonds with terminals of the correct length. Manifestly a terminal stud sufficiently long to insure good results upon compression in a web $\frac{5}{8}$ in. thick, is too long for a web $\frac{3}{8}$ in. thick, as too much copper in a terminal will cause it to form into a rivet head over the hole before the hole is completely filled.

Lacking knowledge of the web thickness, this company will ship bonds with the following terminal lengths for the terminal diameters given. These lengths have been found best suited to average conditions.

Diameter of Terminal

$\frac{1}{8}$ "
 $\frac{3}{16}$ "
 $\frac{1}{4}$ "
 $\frac{5}{16}$ "
 $\frac{3}{8}$ "
 $\frac{7}{16}$ "
 $\frac{1}{2}$ "

Length of Terminal

$\frac{1}{4}$ "
 $\frac{3}{8}$ "
 $\frac{1}{2}$ "
 $\frac{5}{8}$ "
 $\frac{3}{4}$ "
 $\frac{7}{8}$ "
 $1\frac{1}{8}$ "

FORM A RIBBON BONDS

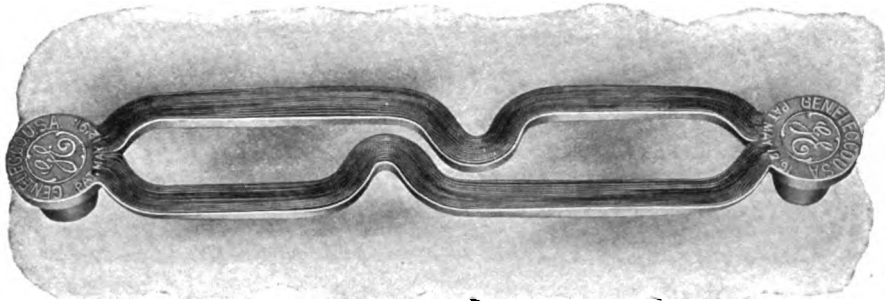
The Form A ribbon bond is furnished for use under the joint plate where, usually, the space is restricted, and extreme compactness of design is necessary. The conductor of this bond is composed of thin copper ribbons pressed into the desired shape. The relative movement of the rails is almost wholly in the vertical plane, therefore the laminations are horizontal so as to afford maximum flexibility in the vertical plane.

The bonding space provided in most rail sections with standard angle bars is so distributed as to require the unbalanced form of bond, having more than half of the total conductor section in the lower branch. The balanced form of bond is suitable for use in the great majority of cases only under special angle bars and the patented joints. To enable us to determine the correct distribution of the conductor laminations all orders for bonds should state the maker's name and section number of the rail on which the bonds are to be used.

* Standard Ribbon Bonds of 4/0 section with $\frac{1}{8}$ in. dia. terminals may be furnished with extra large head on terminal to provide large area of contact.

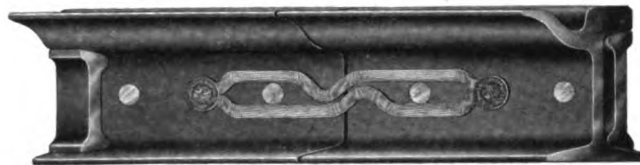
RAIL BONDS

FORM A-1 RIBBON BOND



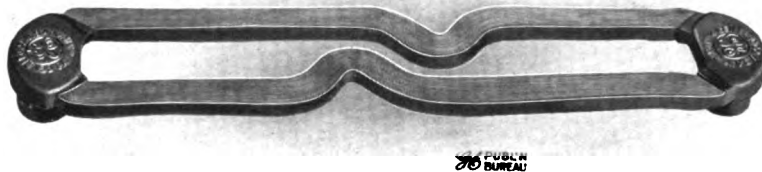
Form A-1 Ribbon Bond Equally Divided Middle Tucking

The above style of bond is used for single bonding rail joints where the available space both above and below the bolts is sufficient to accommodate one-half the total cross sectional area of the bond.



**Girder Rail Bonded with one Form A-1 Ribbon Bond
Spanning Both Inner Bolts**

FORM A-5 RIBBON BOND



PULLEN
BUREAU

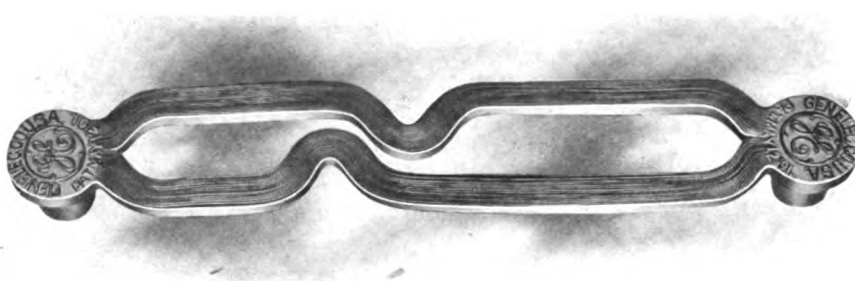
This bond is used under the same conditions as the Form A-1, from which it differs only in the method of bringing the conductors out of the terminal at two points instead of one.



**Girder Rail Bonded with two Form A-5 Ribbon Bonds
Spanning Both Inner Bolts**

RAIL BONDS

FORM A-2 RIBBON BOND



This bond is similar to the Form A-1 excepting that the tucking in the equally divided conductor is offset from the middle of the bond. It is used for double bonding.

All orders for Form A-2 bonds should state the exact location of the bond holes relative to the ends of the rails. This information will determine the location of the tucking.



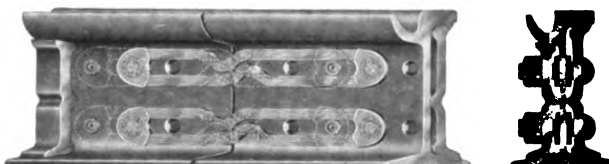
Girder Rail Double Bonded with two Form A-2 Ribbon Bonds

FORM A-6 RIBBON BOND



This bond is similar to the Form A-2 excepting that the conductors issue from the terminal at two points instead of one. The tucking is offset from the middle for double bonding.

When ordering Form A-6 bonds, give the exact location of the bond holes to insure the proper locating of the tuck.



Girder Rail Bonded with four Form A-6 Ribbon Bonds
Two on Each Side of Rail

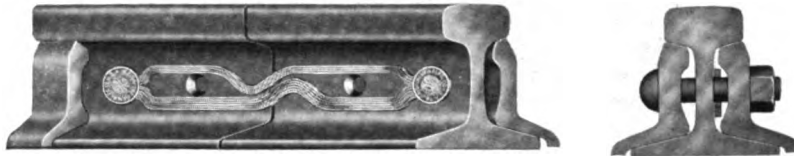
RAIL BONDS

FORM A-3 RIBBON BOND



Form A-3 Unbalanced Ribbon Bond Middle Tucking

This bond is similar to the Form A-1 excepting that it has more ribbons in one branch than in the other. It is adapted for use where the available space on one side of the bolts is insufficient to accommodate one-half of the total conductor section.



T Rail Bonded with one Form A-3 Unbalanced Ribbon Bond

FORM A-7 RIBBON BOND



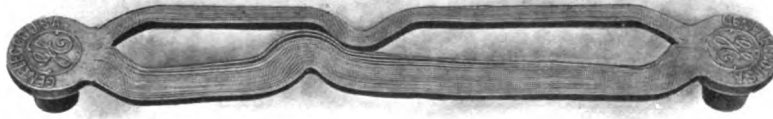
This bond is the same as the Form A-3 excepting that the conductor is brought out of the terminal at two points instead of one.



T Rail Bonded with Form A-7 Ribbon Bond
Spanning Both Inner Bolts

RAIL BONDS

FORM A-4 RIBBON BOND



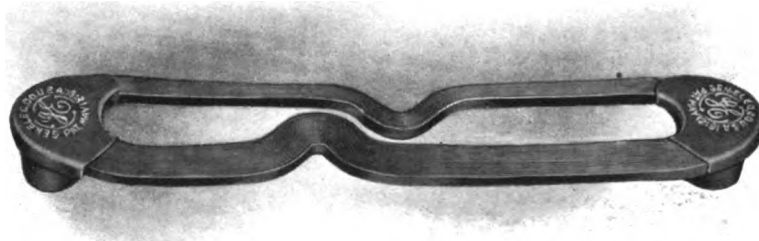
Form A-4 is similar to the Form A-3 excepting that the tuck is offset from the middle. It is used in double bonding.

When ordering A-4 bonds, give the exact location of the bond holes relative to the ends of the rails, so that we may know where to locate the tucking.



T Rail Double Bonded with two Form A-4 Unbalanced Ribbon Bonds

FORM A-8 RIBBON BOND



Form A-8 bond is similar to Form A-4 except in the scheme of having the conductor issue at two points in the terminal instead of one.

This bond is used for double bonding and all orders for it should give the exact location of the bond holes relative to the ends of the rails to insure the proper locating of the tuck.



T Rail Double Bonded with Form A-8 Ribbon Bonds
Spanning Both Inner Bolts

RAIL BONDS

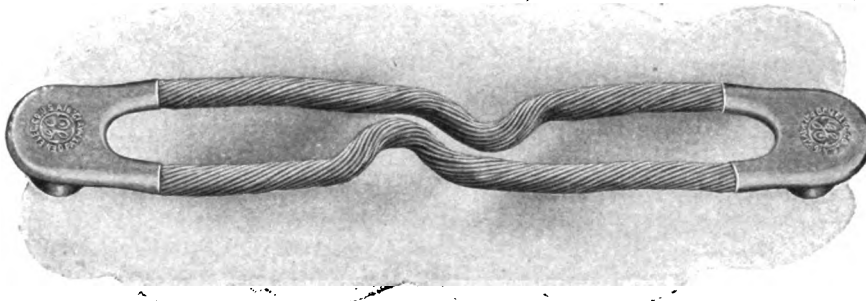
FORM F CABLE BOND

The Form F bond is intended for use under the joint plate. It has cable wire instead of flat wire conductors.

Cable conductors are equally flexible in all planes, and are well adapted for use where the bonding space is not restricted.

The general recommendations that are given for selecting and installing flat wire bonds apply also to cable bonds.

FORM F-5 CABLE BOND

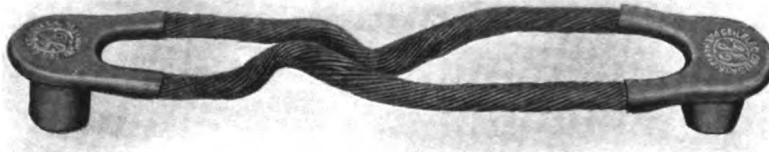


This bond is similar to the Form A-5 excepting the conductor is of extra flexible cable instead of ribbon. It is intended for use under the joint plate when the bonding space permits.



T Rail Bonded with one Form F-5 Bond, Spanning Both Inner Bolts

FORM F-6 CABLE BOND



This bond is similar to Form F-5 except the tucking is offset from the middle. It is adapted to double bonding of joints.

In ordering please give the exact location of the bond holes relative to the ends of the rails, to enable us to locate the tucking.



T Rail Double Bonded with two Form F-6 Bonds

RAIL BONDS

FORM F-9 BOND

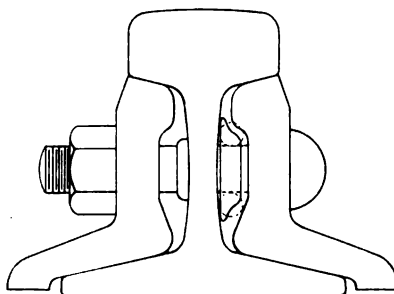


In many sections of rail the bonding space is so distributed that it will not accommodate the standard forms of bonds with equal branches, there being more room below than above the joint plate bolts. When ribbon bonds are employed this condition is met by a bond having more ribbons in the lower branch than in the upper. This method of unbalancing the branches cannot be followed satisfactorily in the cable form of bond because the cable is not so compact as the flat wire conductor, and when a sufficient number of wires are transferred from the upper to the lower conductor to obtain the requisite clearance for the upper branch, the lower branch is too large to fit into the space below the bolts without being badly pinched between the rail and the plate. This pinching will very materially shorten the life of the bond, as the conductor is not free to move.

When the cable form of bond is desired for use where the rail conditions are such as described, this Company recommends that the standard balanced bond be used with the conductors pressed at the factory to a shape that will insure ample clearance between the bond and the angle bar.

The accompanying illustration shows the General Electric Company's Form F-9 cable bond with the conductor pressed to approximately a triangular section excepting in the tuck, where the original round shape of the cable is preserved. The tuck coming between the bolts where there is ample room does not require a change in shape.

Flexibility tests prove that the pressing of the conductor does not affect the life of the bond.



Sectional View of 70 Lb. A.S.C.E. Rail with Standard Angle Bars, Showing 4/0 Bond with Round Cable Conductors in Dotted Lines and Pressed Cable Conductors in Solid Lines

FORM F-10 CABLE BOND

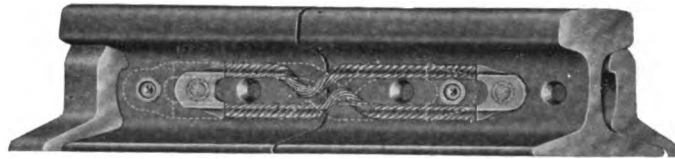


This bond is similar to Form F-9 having pressed cable conductors but is tucked off center to adapt it to double-bonding.

RAIL BONDS

FORM F-10 CABLE BOND—(Concluded)

When ordering F-10 bonds give the exact location of the bond holes relative to the ends of the rails, so that the bonds may be tucked in the right place.



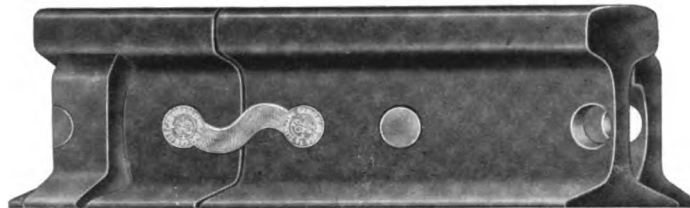
T Rail Double Bonded with two Form F-10 Bonds

FORM B RIBBON BOND



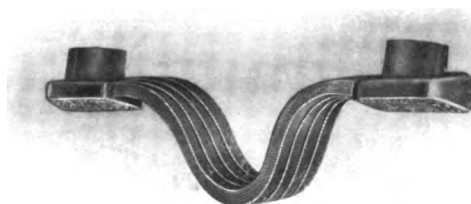
Form B Ribbon Bond

Where the inner bolt holes are located so as to permit the drilling of a bond hole between the end of the rail and the bolt hole, a short bond with undivided conductor in the form of a letter "S" may be installed. This bond must be made too short to embody the requisite flexibility and is recommended only for temporary work, such as is done in mines, where the rails are frequently shifted and the bond destroyed. It is an efficient bond at low cost for this class of work.



T Rail Bonded with One Form B Bond

FORM C RIBBON FOOT BOND FOR FOOT OF RAIL

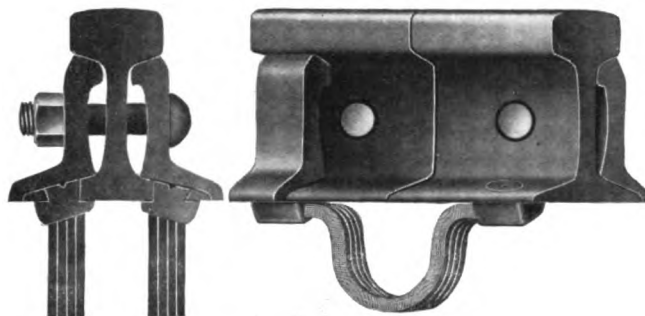


Form C beveled head foot bond is adapted for use on the foot of T rails having suspended joints. Its most general adaptation has been for bonding third rails. The terminal heads are beveled to correspond with the bevel of the rail foot. As in the Forms A and B bonds, the conductor laminations are so disposed as to give maximum flexibility in the vertical plane.

RAIL BONDS

FORM C RIBBON FOOT BOND— (Concluded)

FOR FOOT OF RAIL



Two Form C Beveled Head Bonds Applied to the Base of a T Rail
Largely Used for Bonding Third Rails

To apply this bond the special hydraulic punch shown on page 158, and the hydraulic compressor on page 163 are recommended.

The hydraulic punch of 100 tons capacity punches a tapered hole in the foot of the rail. The smaller aperture of the hole, which is at the bottom, is of the same diameter as the bond terminal. The 35-ton compressor forces the copper back into the hole against the taper until the top of the terminal is flush with the top surface of the rail foot. The holes in the rail may be drilled at right angles with the top surface of the rail foot and the bond applied with screw compressor No. 40294, on page 162.

To furnish Form C bonds with terminals of the correct length to insure flush compression, it is necessary that the section number of the rail and the maker's name be given or a sketch of the rail in cross section, showing the distance between the edge of the foot and the center of the hole, be given.

When greater clearance is desired between bond conductor and track ballast than is obtainable with one long sweeping tuck as illustrated above, double tucking as shown in the accompanying illustration may be employed.

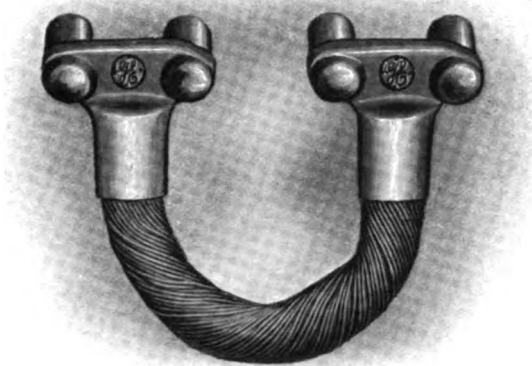
Form C foot bonds should have a developed length of at least 7 in. in the smaller conductor sections, and 9 in. in sections above 350,000 cm. They may be formed to give any required distance between terminal centers.

Made in any length, and section up to 500,000 cm.



RAIL BONDS

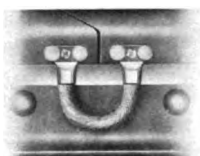
FORM M-1 TWIN STUD TERMINAL BOND



This bond is a new development in rail bonding, and is for application to the outer side of the head of T rails. This form of bond is applied without disturbing the joint plate. It is short—has the requisite flexibility, and is efficient and durable. The bond is installed with simple tools, and its first cost and the cost of installation are low. Its position on the rail makes it easy to inspect. Each terminal with its two studs is forged from soft, pure copper. The studs are $\frac{1}{2}$ in. in diameter, and spaced $1\frac{1}{4}$ in. between centers. The conductor portion of the bond is flexible cable, which is welded to the terminals at low temperature, and all air is excluded. This process insures a perfect union between the terminals and the conductor, and preserves the purity and malleability of the copper. The conductor issues from the lower side of each terminal, and in the direction of the vertical movement of the joint. This construction removes all stress from the terminals and confines it to the flexible portion of the bond.

It is recommended that the four holes for Form M-1 bond be drilled simultaneously with the General Electric Company's double-twin spindle drilling machine, which will insure their being spaced exactly on the required centers and drilled on the same horizontal plane.

APPLICATION



The four holes in the head of the rail are drilled simultaneously by the four-spindle drilling machine shown on page 158, and the bonds applied with a riveting hammer. The sharp edges of the holes should be dulled with a blunt punch, to avoid cutting the terminal studs as they enter the holes. After drilling, a hand milling cutter, shown on page 160, should be inserted in each hole and a small annular groove cut in its walls near the orifice. The copper will flow into this groove, firmly anchoring the stud and sealing the hole against the admission of moisture. The length of the terminal stud should exceed the depth of the hole by $\frac{1}{16}$ in. As the stud in our standard 4/0 bond is $\frac{1}{8}$ in. long, exclusive of the conical end, the straight wall of the hole should be $\frac{1}{2}$ in. deep. On the outer side of the bond terminal, opposite each stud, is a small copper boss. To install the bond, the hammer should be applied to this boss, lightly at first, and gradually with more force, until the boss has disappeared. This operation will completely fill the hole with dense copper, perfect contact being obtained at the ends of the studs, as well as at the sides.

The same general precautions relating to the application of compressed terminal bonds should be observed in connection with twin stud bonds.

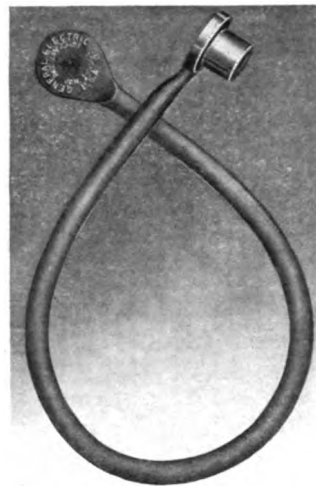
The holes should not be drilled with oil. The contact surfaces of the steel and copper should be dry, clean and bright.

RAIL BONDS

FORMS D AND E RAIL BONDS



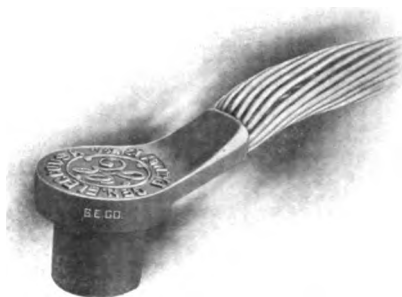
Form D



Form E

In the Form D rail bond the conductor consists of a single stranded cable. The Form E bond is similar but the conductor is solid wire. Both of these forms of rail bond are adapted to bonding around the splice bar of T or grider rails, cross bonding between rails and tracks, and around special work. The conductors emerge from the terminal head at an angle approximating 15 degrees with the plane of the terminal head. The Form D is recommended for short spans such as around a splice bar. The Form E is recommended where long distances are to be spanned.

FORMS D AND E STUB END BONDS

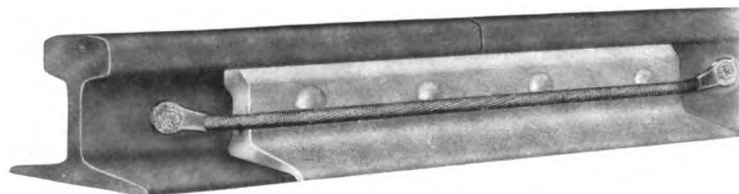


Form D Stub End Bond



Form E Stub End Bond

A stub end bond is a conductor with a terminal on one end only. It is frequently employed in special work, where the cable end is to be spliced to a long bond spanning crossings and special work. The standard length is 12 in. but they can be furnished in any length desired.



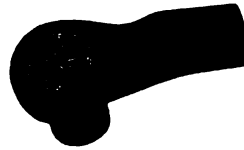
Form D Bond Spanning Splice Bar of T Rail

The developed length of the Form D bond for spanning splice bars should be at least 4 in. longer than the splice bar.

Bonds furnished in any length or section.

RAIL BONDS

SEPARATE BOND TERMINALS



Separate bond terminals are furnished, drilled and tinned for soldering to a conductor which may be scrap trolley wire or feeder cable. They are useful in bonding special work, where many different distances are to be spanned and where it is difficult to predetermine the exact length.

DRILLING OF TERMINAL SHANKS

Orders should specify size of wire or cable conductor to be used and diameter of stud required. When size of conductor is given, in the absence of specifications to the contrary, drilling will be made as follows:

Conductor Cross Section	Diameter of Hole in Shank
0	1 1/2"
00	1 1/4"
000	1 1/2"
0000	1 3/4"
250,000 c.m.	1 7/8"
300,000 c.m.	2"
350,000 c.m.	2 1/8"
400,000 c.m.	2 1/4"
450,000 c.m.	2 3/8"
500,000 c.m.	2 1/2"

FEEDER CLAMPS FOR CONDUCTOR RAIL



These clamps are for attaching to feeder cables in third rail systems. Stub end bond terminals, shown on page 142, are soldered into the sleeves, and the studs compressed in the conductor rail. In ordering state size of cable and size of bond conductor to be used.

SOLDERED RAIL BONDS

Appreciating that, in a limited way, there is a legitimate field for soldered rail bonds (as in temporary work, or in bonding old rails where it would prove too expensive to remove the joint plate with the consequent renewal of all bolts), the General Electric Company has developed a full line of bonds of this type.

Great care should be exercised in the soldering, as it often occurs that while the union is strong enough to hold the bond on the rail, the actual area of contact is insufficient to give good electrical results.

RAIL BONDS

SOLDERED RAIL BONDS—(Continued)

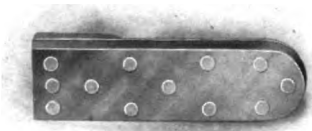
As in stud terminal bonds, ribbon conductors are employed when short distances are to be spanned or where space is restricted, as under fish plates, and the laminations are invariably disposed in the horizontal plane in order to afford maximum flexibility to meet the vertical movement of the rail joint.

For bonding to the head of the rail we make a cable wire as well as a ribbon wire bond.

For bonding around fish plates and special work and for cross bonding, etc., cable conductor is employed.

In all of these forms the conductor is *welded* into *forged* copper terminals.

The contact surfaces of all soldered bond terminals are furnished with minute spot bosses which provide space between terminal and rail for an elastic film of solder, to compensate for the different contraction coefficients of the copper and steel.



APPLICATION

The application of soldered rail bonds requires the utmost care to insure adequate electrical and mechanical union between the copper and the steel. This is especially so where the bonds are to be applied to a vertical surface such as the ball or the web of the rail.

The cleaning and tinning of the rail surfaces for the reception of soldered bonds cannot be done too carefully, especially in the case of bonds installed on a vertical surface. All rust and scale must be removed from the surface and the rail heated until the cleaned surface shows a violet or light blue color (280 degrees to 290 degrees C.). Soldering flux (preferably zinc chloride) should then be applied with brush or swab and heavy bar solder rubbed on the cleaned surface until it is thoroughly tinned. The bond should then be clamped lightly to the rail and the joint heated sufficiently to quickly melt wire solder applied to it. The clamp should then be tightened and the wire solder applied as the joint cools down. The practice of cooling the joints with water after soldering has usually been followed in order to expedite the work, but there is good reason to believe that the sudden contraction of the copper terminal, which will respond more quickly than the rail to the cooling effect of the water, tends to shear off the film of solder between terminal and rail. The joints should, therefore, be allowed to cool down naturally if traffic conditions under which the work is done will permit it.

The completed joint should be painted with a good black weatherproof paint.

An efficient working gang for installing soldered bonds consists of a skilled and trustworthy man to direct the work and do the soldering, one helper to handle the torches and two men to operate the grinder.

FORM AS SOLDERED BOND FOR ATTACHMENT TO WEB OF RAIL UNDER FISH PLATE



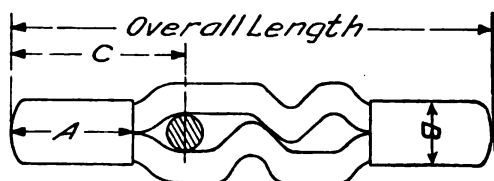
The Form AS bond corresponds to the Form A stud terminal bond, and is used under like conditions, the terminals being soldered to the web of the rail, and the laminations being divided and "tucked" to span the fish plate bolts.



T Rail Bonded with one Form AS-3 Bond

RAIL BONDS

FORM AS SOLDERED BOND—(Concluded)
FOR ATTACHMENT TO WEB OF RAIL UNDER FISH PLATE



Conductor	DIMENSIONS			Thickness Terminal
	A	B	C	
0000	1.75"	1.00"	2.69"	$\frac{1}{4}$ "
300000	1.85"	1.09"	2.875"	$\frac{5}{16}$ "

In the dimension table the minimum distance (dimension C) between the center of the fish plate bolt spanned by the conductor, and the outer end of the terminal, is given to assist in determining the overall length necessary for any given joint. As in the classification of the stud terminal bonds, a numeral after the form letters of the Form AS bonds indicates the division and tucking of the ribbons, thus:

Form AS 1 has equally divided ribbons and center tucking.

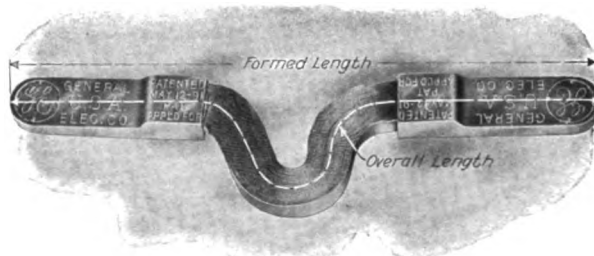
Form AS 2 has equally divided ribbons and offset tucking.

Form AS 3 has unbalanced ribbons and center tucking.

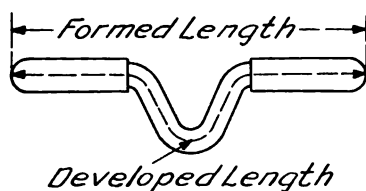
Form AS 4 has unbalanced ribbons and offset tucking.

On account of the inaccessibility of the Form AS bonds under the fish plates it is essential that they be installed with the greatest care to insure permanency of contact with the rail.

FORM BS SOLDERED BONDS



The Form BS bonds are applied to the outer side of the rail head and do not require removal of the fish plate for their installation. On account of the small amount of material which they contain and the difficulty of removing them by ordinary means, they are practically safe from loss by theft.



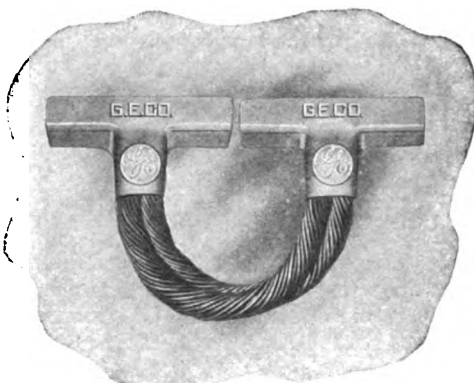
Conductor Section	Overall Developed Length	Formed Length
00	7.73"	6"
0000	8.83"	7 $\frac{1}{4}$ "
400000	11.03"	8 $\frac{1}{4}$ "



Form BS Bond Applied to Ball of Rail

RAIL BONDS

FORM GS SOLDERED BOND



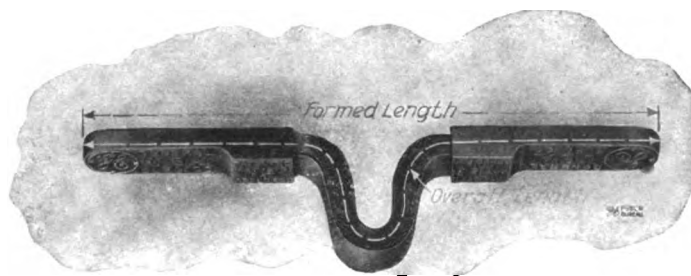
In the Form GS soldered bond the cable conductor is brought out straight from a point midway between the ends of each terminal. The terminal has a sleeve through which the conductor emerges, which prevents the small wires from being reduced in cross section in the welding operation. This bond is for application to the ball of the rail, and is formed to clear the splice bar. The terminals are tapered and the thinner edge is at the top, making the bond less likely to be knocked off.



T Rail Bonded with one Form GS Bond

Conductor Section	Overall Developed Length	Formed Length
0000	7"	6"

FORM CS SOLDERED BONDS



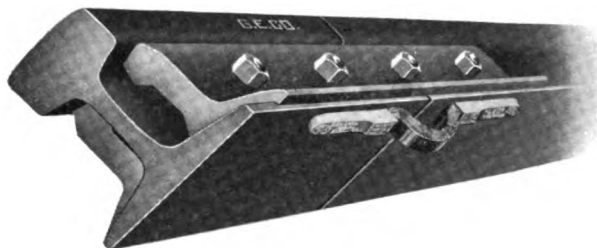
Form CS Bond

The Form CS bond is designed for attachment to the top or the bottom of the rail base.

RAIL BONDS

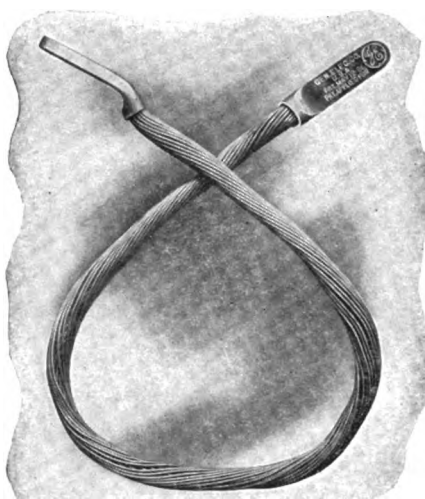
FORM CS SOLDERED BONDS—(Concluded)

Conductor Section	Overall Developed Length	Formed Length
00	7.73"	6"
0000	8.83"	7½"



Form CS Bond Applied to Base of Rail

FORM DS SOLDERED BOND



The Form DS soldered bond corresponds to the Form D terminal stud bond, and is for bonding around joint plates, crossbonding, and bonding around special track work.

Conductor Section	DIMENSIONS OF TERMINALS IN INCHES		
	Length	Width	Thickness
00	1.75	.625	.25
0000	2.25	.75	.28

RAIL BONDS

CHANNEL PINS

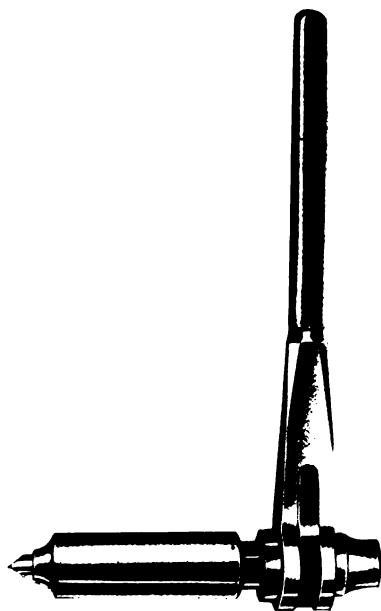
Channel pins are not recommended for permanent bonding but are occasionally useful for temporary work. They are made with a straight groove deep enough to avoid cutting the wire in driving. The pins are taper pointed and slightly larger than the hole, so that when driven they envelop the wire and make a solid joint.



Cat. No. 17315

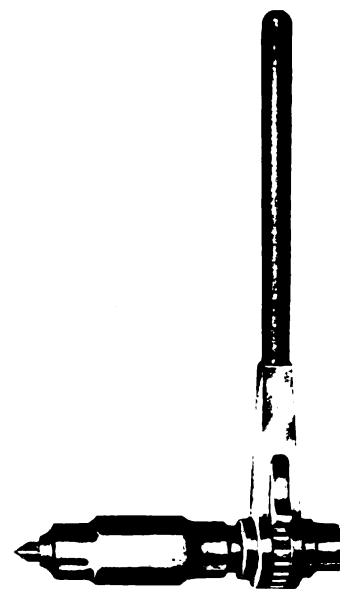
Cat. No.	Diameter	Size of Wire	Weight per 1000
17225	$\frac{1}{8}$ "	4	20
17224	$\frac{3}{16}$ "	0	40
17315	$\frac{1}{2}$ "	00	90
17553	$\frac{3}{4}$ "	0000	70

TRACK DRILLING AND PUNCHING DEVICES AND ACCESSORIES—DRILLS



Many methods are employed for drilling bond holes in rails. Without definite knowledge of the amount of work and the conditions under which it is to be performed, it is difficult to recommend the style of machine to employ. The intention in compiling this information has been to give data on a complete line of devices generally used for drilling and punching rails, from the simplest hand ratchet to the more elaborate power drills and hydraulic punches.

In many cases railways are having bond holes punched or drilled in rails at the mills. It is important that such holes be reamed bright before the bond is applied.



RAIL BONDS

TRACK DRILLING AND PUNCHING DEVICES AND ACCESSORIES—DRILLS—(Concluded)

HAND RATCHET DRILLS WITH SQUARE TAPER SOCKET

CAT. NO.		DIMENSIONS		Feed	Weight in Lb.	Socket Accommodates
Round Feed Sleeve	Hex. Feed Sleeve	Length of Handle	Length of Sleeve			
103273		10"	7 $\frac{1}{4}$ "	2"	5	No. 1 sq. taper shank drill $\frac{1}{8}$ " to 1 $\frac{1}{2}$ " dia.
103274		12"	8 $\frac{1}{2}$ "	2 $\frac{1}{8}$ "	7	No. 1 sq. taper shank drill $\frac{1}{8}$ " to 1 $\frac{1}{2}$ " dia.
103275	103278	15"	9 $\frac{1}{2}$ "	3"	9 $\frac{1}{2}$	No. 1 sq. taper shank drill $\frac{1}{8}$ " to 1 $\frac{1}{2}$ " dia.
103276	103279	17"	10 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	12	No. 2 sq. taper shank drill $\frac{1}{8}$ " to 2" dia.
103277	103280	20"	11 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	15 $\frac{1}{2}$	No. 2 sq. taper shank drill $\frac{1}{8}$ " to 2" dia.

HAND RATCHET DRILLS WITH ROUND TAPER SOCKET

CAT. NO.	Length of Handle	Length of Sleeve	Feed	Weight in Lb.	TAKES MORSE ROUND TAPER SHANK DRILL		Socket Accommodates
					Min.	Max.	
103281	10"	7 $\frac{1}{4}$ "	1 $\frac{1}{8}$ "	5	1 $\frac{1}{8}$ "	1 $\frac{1}{2}$ "	{ Cat. No. 103285 taper drill sleeve Cat. No. 103289 flat drill socket Cat. Nos. 103285 and 103286 taper drill sleeve Cat. No. 103290 flat drill socket Cat. No. 103287 taper drill sleeve Cat. No. 103291 flat drill socket
103282	12"	8 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	6 $\frac{1}{2}$	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	
103283	15"	9 $\frac{1}{2}$ "	2 $\frac{1}{4}$ "	9	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	
103284	17"	10 $\frac{1}{4}$ "	2 $\frac{5}{16}$ "	11	1 $\frac{1}{2}$ "	2"	

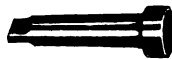
TAPER SLEEVES FOR HAND RATCHET DRILLS



Taper Sleeve

Cat. No.	Used with Hand Ratchet No.	Takes Standard or Morse Tapered Shank Drills
103285	103282 and 103283	1 $\frac{1}{8}$ " to 1 $\frac{1}{2}$ " dia.
103286	103283	1 $\frac{1}{2}$ " to 1 $\frac{1}{2}$ " dia.
103287	103284	1 $\frac{1}{2}$ " to 1 $\frac{1}{2}$ " dia.

FLAT DRILL SOCKETS FOR HAND RATCHET DRILLS



Flat drill sockets accommodate drills (flat or round) with standard or Morse square taper shank No. 1 or No. 2.

Cat. No. 103289 fits in hand ratchet Cat. No. 103282.

Cat. No. 103290 fits in hand ratchet Cat. No. 103283.

Cat. No. 103291 fits in hand ratchet Cat. No. 103284.

RAIL BONDS
SQUARE TAPER SHANK DRILLS (No. 1 SHANK)
FOR USE WITH HAND RATCHET DRILLS



Shank $1\frac{1}{2}$ in. long, tapered $\frac{5}{8}$ in. to $\frac{3}{8}$ in.

Cat. No.	Diameter	Length Overall	Length Twist
103310	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103311	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103312	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103313	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103314	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103315	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103316	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103317	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103318	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103319	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103320	$\frac{1}{2}$ "	7"	$4\frac{1}{2}$ "
103321	$\frac{1}{2}$ "	7"	$4\frac{1}{2}$ "
103322	$\frac{1}{2}$ "	$7\frac{1}{2}$ "	$5\frac{1}{2}$ "
103323	$\frac{1}{2}$ "	$7\frac{1}{2}$ "	$5\frac{1}{2}$ "
103324	$\frac{1}{2}$ "	8"	$5\frac{1}{2}$ "
103325	$\frac{1}{2}$ "	8"	$5\frac{1}{2}$ "
103326	1"	$8\frac{1}{2}$ "	$6\frac{1}{2}$ "
103327	$1\frac{1}{2}$ "	$8\frac{1}{2}$ "	$6\frac{1}{2}$ "
103328	$1\frac{1}{2}$ "	9"	$6\frac{1}{2}$ "

SQUARE TAPER SHANK DRILLS (No. 2 SHANK)
FOR USE WITH HAND RATCHET DRILLS

Shank $1\frac{1}{4}$ in. long, tapered $\frac{3}{4}$ in. to $\frac{1}{2}$ in.

Cat. No.	Diameter	Length Overall	Length Twist
103329	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103330	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103331	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103332	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103333	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103334	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103335	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103336	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103337	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	4"
103338	$\frac{1}{2}$ "	$6\frac{1}{2}$ "	$4\frac{1}{2}$ "
103339	$\frac{1}{2}$ "	7"	$4\frac{1}{2}$ "
103340	$\frac{1}{2}$ "	7"	$4\frac{1}{2}$ "
103341	$\frac{1}{2}$ "	$7\frac{1}{2}$ "	5"
103342	$\frac{1}{2}$ "	$7\frac{1}{2}$ "	5"
103343	$\frac{1}{2}$ "	8"	$5\frac{1}{2}$ "
103344	$\frac{1}{2}$ "	8"	$5\frac{1}{2}$ "
103345	1"	$8\frac{1}{2}$ "	$5\frac{1}{2}$ "
103346	$1\frac{1}{2}$ "	$8\frac{1}{2}$ "	$5\frac{1}{2}$ "
103347	$1\frac{1}{2}$ "	9"	$6\frac{1}{2}$ "

RAIL BONDS
TAPER SHANK TWIST DRILLS
STANDARD OR MORSE TAPER FOR USE WITH HAND RATCHETS



Cat. No.	Diameter	Length Overall	Length Twist
103348	$\frac{1}{2}$ "	7 $\frac{3}{4}$ "	4 $\frac{1}{2}$ "
103349	$\frac{1}{2}$ "	8"	4 $\frac{1}{2}$ "
103350	$\frac{3}{8}$ "	8 $\frac{1}{4}$ "	5"
103351	$\frac{3}{8}$ "	8 $\frac{1}{2}$ "	5"
103352	$\frac{3}{8}$ "	8 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
103353	$\frac{3}{8}$ "	9"	5 $\frac{1}{2}$ "
103354	$\frac{1}{2}$ "	9 $\frac{1}{4}$ "	5 $\frac{1}{2}$ "
103355	$\frac{1}{2}$ "	9 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "
103356	$\frac{1}{2}$ "	9 $\frac{3}{4}$ "	6 $\frac{1}{2}$ "
103357	$\frac{1}{2}$ "	9 $\frac{7}{8}$ "	6 $\frac{1}{2}$ "
103358	$\frac{1}{2}$ "	10"	6 $\frac{1}{2}$ "
103359	$\frac{1}{2}$ "	10 $\frac{1}{4}$ "	6 $\frac{1}{2}$ "
103360	$\frac{1}{2}$ "	10 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "
103361	$\frac{1}{2}$ "	10 $\frac{3}{4}$ "	7"
103362	$\frac{1}{2}$ "	10 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "
103363	$\frac{1}{2}$ "	10 $\frac{7}{8}$ "	6 $\frac{1}{2}$ "
103364	1"	11"	6 $\frac{1}{2}$ "
103365	1 $\frac{1}{32}$ "	11 $\frac{1}{8}$ "	7"
103366	1 $\frac{1}{16}$ "	11 $\frac{1}{4}$ "	7 $\frac{1}{8}$ "

FLAT DRILLS WITH STANDARD OR MORSE SQUARE TAPER SHANK
NOS. 1 OR 2



Flat Drill

CAT. NO.		Diameter
No. 1 Shank	No. 2 Shank	
103292	103301	$\frac{1}{8}$ "
103293	103302	$\frac{3}{16}$ "
103294	103303	$\frac{1}{4}$ "
103295	103304	$\frac{5}{16}$ "
103296	103305	$\frac{3}{8}$ "
103297	103306	1"
103298	103307	1 $\frac{1}{8}$ "
103299	103308	1 $\frac{1}{4}$ "
103300	103309	1 $\frac{3}{8}$ "

All drills 6 in. long. Drills easily sharpened and capable of fast work. Adapted to hand ratchets with square taper sockets.



Drift

Cat. No. 103386 drift is used to remove taper drills and sockets from ratchet drill shanks. It is 7 in. long, finished complete and case hardened.

RAIL BONDS

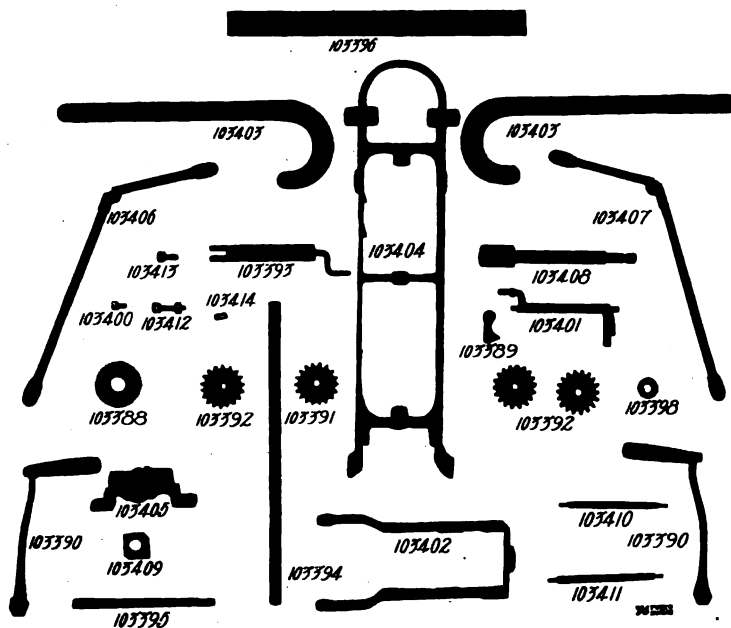
CLIMAX TRACK DRILL



This track drill is substantially built and well adapted to hard usage. It has crucible steel gears and forged steel hooks. The hooks are shaped to permit drilling of holes as close as $\frac{1}{4}$ in. to the end of the rail, and are adjustable lengthwise to extend over a Weber joint or a guard rail. The hooks may be adjusted to the height of the rail by a set screw. To clear the track it is necessary only to break the back brace and throw the hooks backward.

Cat. Co.	Description	Weight in Lb.
103387	Climax Track Drill for T Rail	60

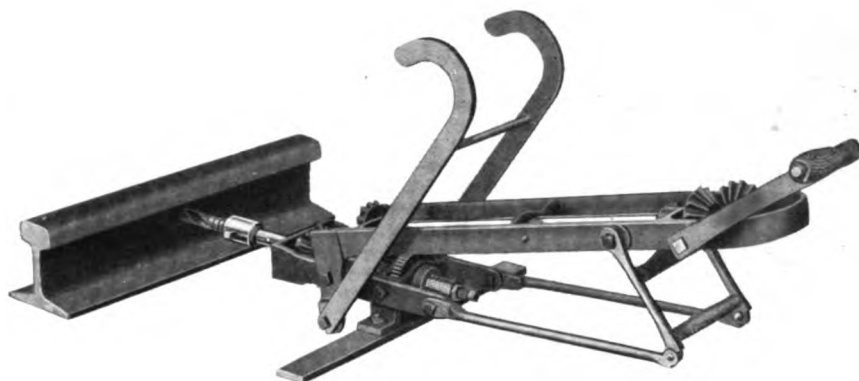
REPAIR PARTS FOR CLIMAX DRILL



Cat. No.	Description	Cat. No.	Description
103388	Ratchet Wheel	103402	Bottom Frame
103389	Ratchet Feed Dog	103403	Hook (2)
103390	Crank (2)	103404	Upright Frame
103391	Eccentric Gear	103405	Nut Box
103392	Bevel Gear (3)	103406	Right Toggle Joint
103393	Feed Screw	103407	Left Toggle Joint
103394	Vertical Shaft	103408	Spindle
103395	Crank Shaft	103409	Steel Nut
103396	Foot Plate	103410	Joint Handle
103397	Foot Plate Bolt (2)	103411	Hook Coupling
103398	Ball Bearing	103412	$1\frac{1}{4}$ " Bolt (6)
103399	Brass Bushing	103413	$1\frac{1}{8}$ " Bolt (3)
103400	Spindle Cap Set Screw	103414	Key for Ratchet Wheel
103401	Rocker Shaft		

RAIL BONDS

PAULUS TRACK DRILL

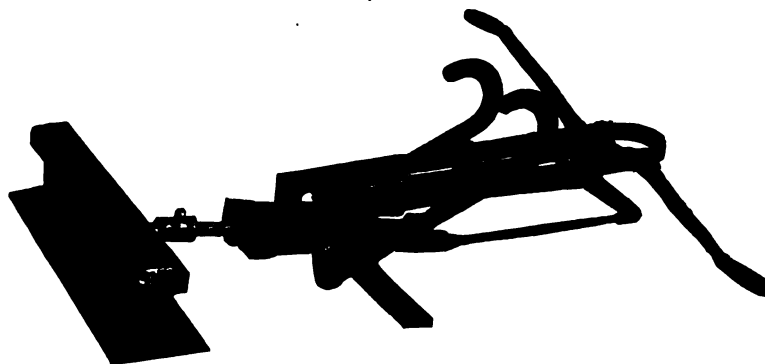


The Paulus Track Drill has proved to be a most satisfactory hand operated upright machine for drilling rails. It is provided with an automatic feeding device that requires no attention. A dog connecting ratchet on the feed screw is operated by an eccentric which is put in motion by the revolving spindle and results in as coarse a feed as is consistent with the best results from a point of view of time and of safety to the bit.



Cat. No.	Description	Weight in Lb.
103415	Paulus Track Drill for T Rail	60
103416	Paulus Track Drill for Girder Rail	100

REPAIR PARTS OF PAULUS TRACK DRILL

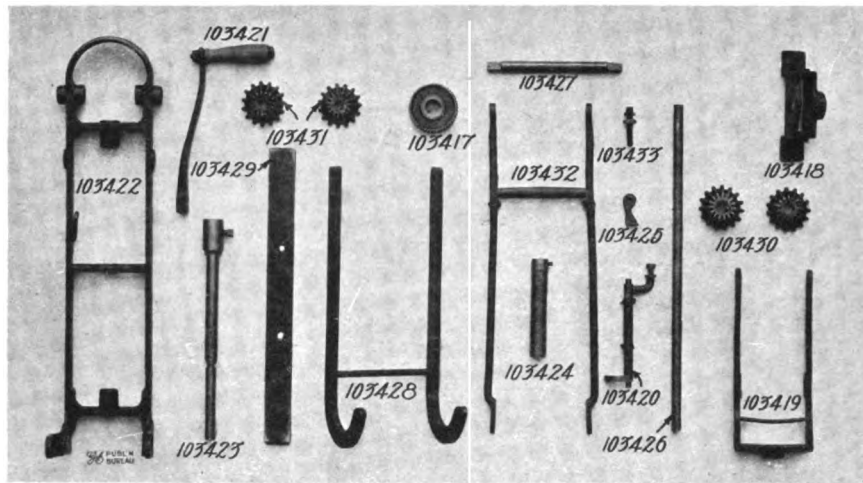


Following is a list of renewal parts for Paulus Track Drills:

When ordering repair parts for Paulus Drills please state whether they are required for the "T" rail or girder rail pattern.

RAIL BONDS

REPAIR PARTS OF PAULUS TRACK DRILL—(Concluded)

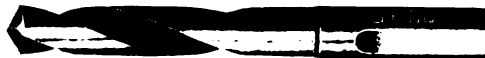


Cat. No.	Description	Cat. No.	Description
103417	Ratchet Wheel	103426	Vertical Shaft
103418	Housing for Ratchet Wheel	103427	Crank Shaft
103419	Lower Frame	*103428	Rail Hooks
103420	Rocker Shaft	103429	Foot Plate
103421	Two Cranks	103430	Two Upper Gears
103422	Upper Frame	103431	Two Lower Gears
103423	Spindle	103432	Back Brace
103424	Feed Screw	103433	Set Screw
103425	Ratchet Feed Dog		

* Style of rail, T or Girder, must be specified.

ROUND STRAIGHT SHANK DRILLS

These drills listed below are adapted to drilling machines shown on pages 152 and 153.
Diameter of shank is $\frac{3}{8}$ in.; length of shank $2\frac{1}{4}$ in.; length overall 6 in.; length of twist 3 in.



Cat. No.	Diameter	Cat. No.	Diameter	Cat. No.	Diameter	Cat. No.	Diameter
103434	$\frac{1}{2}$ "	103439	$\frac{3}{8}$ "	103444	$\frac{1}{2}$ "	103449	$\frac{3}{8}$ "
103435	$\frac{1}{4}$ "	103440	$\frac{1}{4}$ "	103445	$\frac{3}{8}$ "	103450	1"
103436	$\frac{1}{8}$ "	103441	$\frac{3}{16}$ "	103446	$\frac{1}{4}$ "	103451	$1\frac{1}{2}$ "
103437	$\frac{3}{16}$ "	103442	$\frac{1}{2}$ "	103447	$\frac{3}{8}$ "	103452	$1\frac{3}{4}$ "
103438	$\frac{5}{8}$ "	103443	$\frac{3}{4}$ "	103448	$\frac{1}{2}$ "		

THE MAGIC HIGH SPEED BIT



The Magic High Speed Bit

This bit is made of Sheffield air hardened steel and will retain its temper even at a very high temperature.

RAIL BONDS

THE MAGIC HIGH SPEED BIT—(Concluded)

Fits the chuck of any standard collapsible track drill. Diameter of rod shank $\frac{11}{16}$ in. May be used with drilling machines shown on pages 152 and 153.

Cat. No.	Dia. of Bit
103453	$\frac{1}{2}$ "
103454	$\frac{3}{8}$ "
103455	$\frac{3}{4}$ "
103456	$\frac{7}{8}$ "
103457	1"

. FLAT HIGH-SPEED STEEL BITS

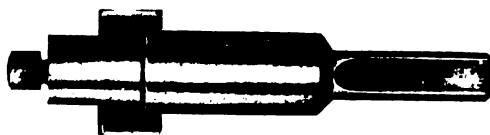


These bits do not require any special or expensive chuck, as they have same size shank as the standard track drill bit. They bore easily and quickly, and retain their cutting edge much longer, and can readily be reground.

Cat. No.	Size, Inches	Cat. No.	Size, Inches
103458	$\frac{5}{8}$ "	103462	$\frac{7}{8}$ "
103459	$\frac{11}{16}$ "	103463	$\frac{13}{16}$ "
103460	$\frac{3}{4}$ "	103464	1"
103416	$\frac{13}{16}$ "	103465	$1\frac{1}{16}$ "

Bits have $\frac{11}{16}$ in. straight shank, and may be used with drilling machine shown on pages 152 and 153.

RAIL FACING TOOLS



Diameter of shank $\frac{11}{16}$ in.

For use with upright drills on pages 152 and 153.

This tool is used to clean the surface of the rail surrounding the bond hole. When the head of a compressed terminal bond is to be soldered to the rail it is essential that the rail be brightened to insure good contact.

In ordering, specify diameter of bond hole.

Cat. No.	Description
103466	Facing Tool for Upright Drills

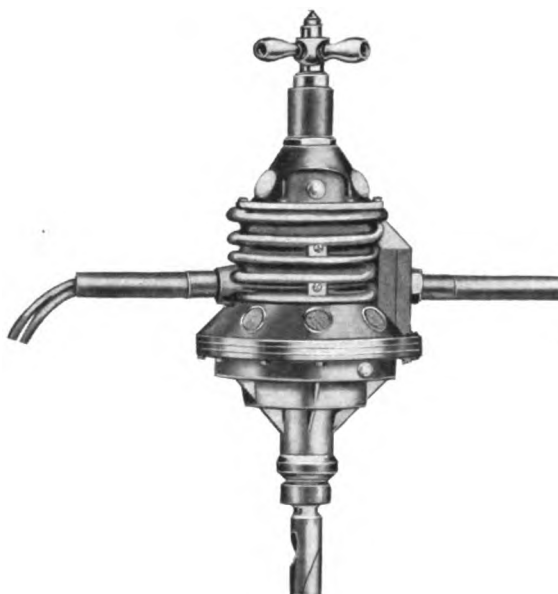


This tool is for the same purpose as the one above, but is adapted for use with hand ratchet drills on page 149. Specify size of taper shank desired.

103467	Facing Tool for Ratchet Drills
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RAIL BONDS

DUNTLEY ELECTRIC DRILL

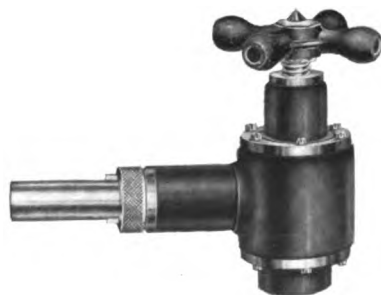


This drill has been specially designed to operate on circuits of from 450 to 600 volts direct current, and will handle drilling in iron or steel up to 1 in. in diameter. For wood boring it will handle work up to 2½ in. in a very satisfactory manner. This drill is regularly equipped with socket to take standard round, taper shank drills. It is furnished with feed screw, starting switch, 20 ft. of cable, and a fuse block and 3 fuses.

Special precautions have been taken to prevent danger of shocks to workmen, and if directions are followed there is no danger from this source, even though the windings of the tool may become grounded.

The design and construction of these tools has been carefully worked out in accordance with the most approved principles. The armature is built up on a steel shaft, hardened and ground, and with the driving pinion an integral part. The armature core is made of the highest grade of electrical sheet, and is wound with specially insulated magnet wire, held in the slots by means of wedges, no binding wire being used. The commutator is large in diameter, containing a great many bars of hard drawn copper, insulated throughout with the best amber mica. The brushes are of carbon. A fan is provided on the armature shaft and revolves at the speed of the armature, setting up a circulation of air through the openings provided for that purpose.

Cat. No.	Description	Weight in Lb.
103468	Duntley Electric Drill	35

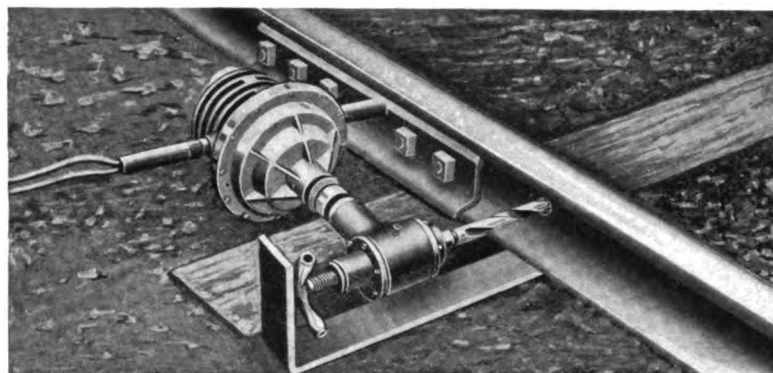


No. 3 BOYER ANGLE GEAR

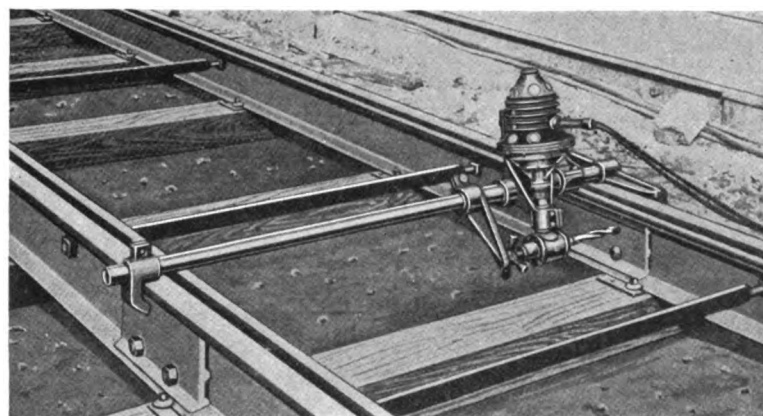
Where it is necessary to work in very close quarters or drill near to the ties, we recommend the use of our No. 3 Boyer Angle Gear in connection with our electric drill. This gear is no larger than an ordinary hand ratchet. Distance from center of spindle to the outside of housing, 1¼ in. Distance from point of feed screw to the end of socket, 8¼ in.

RAIL BONDS**No. 3 BOYER ANGLE GEAR—(Concluded)**

Cat. No.	Description	Weight in Lb.
103469	No. 3 Boyer Angle Gear	13

**Application of the Angle Gear**

The application of the angle gear in connection with the Duntley drill and ordinary "old man" is shown in the accompanying illustration. The angle gear is used here on account of the shallowness of the track, which will not permit the use of the drill directly.

DUNTLEY TRACK DRILL

The accompanying illustration shows the combination of the Duntley 550-volt drill and the Boyer angle gear in a track drill, being built with a view of accomplishing quick and accurate work in the drilling of track for bond holes, joint plate or tie rods. The relative positions of the drill and angle gear are maintained by means of a connecting casting which slides on a split sleeve or quill on the main bar. This sleeve can be clamped to the bar in any desired position, and when so clamped limits the drill to a longitudinal movement, due to a feather in the quill.

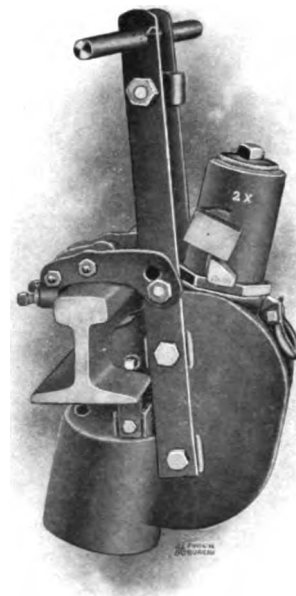
In drilling, the feed screw is forced against the backing up arm, which can be readily loosened and backed up after a hole has been drilled, allowing the drill and angle gear to be pulled back out of the way. Weight 120 pounds. Capacity 1 in. steel.

RAIL BONDS

HYDRAULIC FOOT BOND PUNCH

This tool is designed to punch bond holes in the foot of T rails. The ram and punch are at the bottom or underneath the rail and operate upwards, punching a tapered hole with the large aperture at the top. The tool punches the hole at right angles with the top surface of the rail base. Dogs provided with adjusting screws drop over the ball of the rail, preserving the alignment and holding the tool firmly during operation. Guide pieces are provided to show proper location of bond holes. A rod placed at the end of the punch after the slug is removed forces the ram back into the cylinder by a crank placed between the two vertical handles.

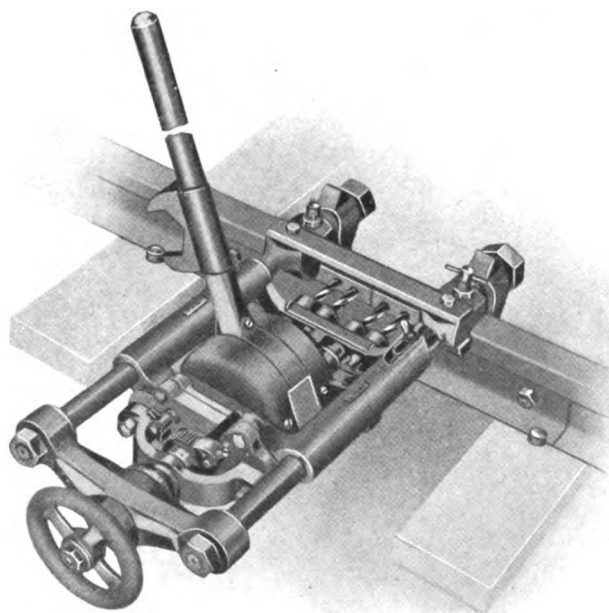
This is the companion tool to the Hydraulic Foot Bond Compressor shown on page 163.



Cat. No. 40295

Cat. No.	Description	Weight in Lb.
40295	Hydraulic Foot Bond Punch, 100 tons	180

DOUBLE-TWIN SPINDLE DRILL



This machine is designed to drill all four holes at one time in the head of T rails for the Twin Stud Terminal Bond. The machine is easy to handle and operate, and it works rapidly and accurately. It has a positive automatic feeding device, which can be adjusted within wide limits. The drills are operated by a lever, each stroke of which rotates the drills through a positive mechanism which provides equal rotation for all drill points.

Each spindle is provided with an adjusting sleeve so that each drill may be set independently of the others. This provision offsets uneven wearing or setting of rails and disalignment of rails on curves. Each machine is equipped with a gauge for determining the depth of the holes. Frames can be raised or lowered quickly to bring the holes into their correct positions. The machines are attached to the rails and operated without disturbing rail joints.

RAIL BONDS

DOUBLE-TWIN SPINDLE DRILL—(Concluded)

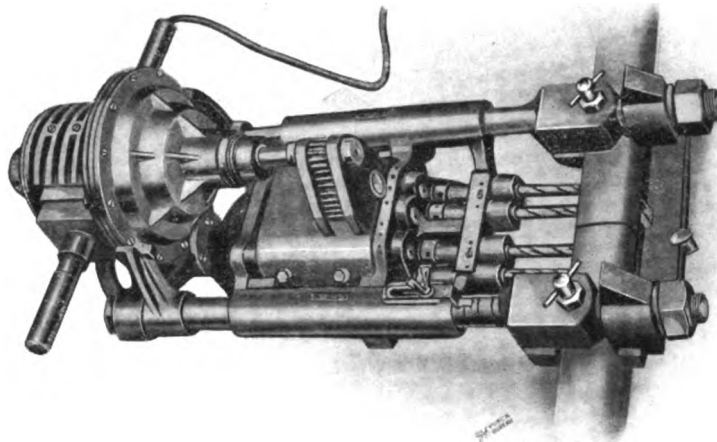
The drill points are held rigidly in the machine and seldom break or chip. For the same reason the desired holes may be started without first prick punching the rail.

The levers by which the machines are operated are detachable so that the tools may be moved easily from place to place. When car or train service over the tracks to be bonded must not be disturbed, these drilling machines can be attached rigidly to the splice bars instead of to the head of the rail. •

Each drilling machine is equipped with all fittings and one complete set of new drills. Many parts of these machines are interchangeable and small parts may be ordered by mail.

Cat. No.	Description	Weight in Lb.
103470	Hand Operated Double-Twin Spindle Drill	125

MOTOR DRILL



Double-Twin Drill Operated by Electric Motor

The Multiple-Spindle Drill is so designed that it can be operated by a small electric motor instead of a lever. The machine as shown makes a very compact and efficient portable drill. It is a highly developed, high speed tool, that will endure the very severe conditions of track work. Easily handled and operated by two men. With this machine, Twin Terminal bonds can be installed at a very low cost.

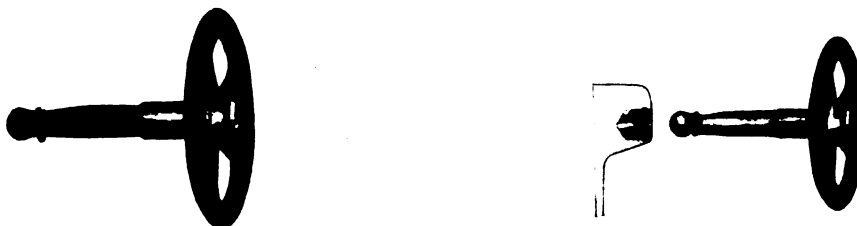
The motor is extremely light and compact, and it will operate directly on a 500-volt trolley circuit. The internal windings are thoroughly well protected and insulated, and the armature shaft is geared direct to the drill spindles. A device, not shown, for correctly and easily sharpening the drills can be attached to the motor.

Cat. No.	Description	Weight in Lb.
103471	Motor Operated Double-Twin Spindle Drill	280

RAIL BONDS**TWIST DRILLS**

These drills are made especially for the Double-Twin Spindle Drill and are uniform in size, being $\frac{1}{2}$ in. in diameter by 6 in. long. The drills give very good results without lubrication if they are properly sharpened.

Cat. No.	Description
103472	Special $\frac{1}{2}$ " Twist Drill

HAND TOOLS FOR TWIN STUD TERMINAL BONDS**HAND MILLING CUTTER**

The Hand Milling Cutter cuts the small groove in the hole. With a swinging motion that will keep the milling teeth pressed against the sides of the hole, the cutter is rotated several times within the hole.

Cat. No.	Description	Weight in Lb.
103473	Milling Cutter with handle	$\frac{1}{2}$
103474	Extra Cutter only	$\frac{1}{4}$



The punch is made of tool steel, tempered. It is to round off and blunt the sharp edge of the hole.

The double faced riveting hammer is especially adapted for applying twin stud terminal bonds.

Cat. No.	Description	Weight
103475	Dulling Punch	3 oz.
103476	Riveting Hammer	2 $\frac{1}{2}$ lb.

RAIL BONDS

RAIL BOND COMPRESSORS

DOUBLE SCREW COMPRESSORS



All of our Double Screw Compressors are of the same design, and differ only in size and the amount of pressure they exert. The distribution of the metal in the frame is such as to make the machines strong and substantial, and as light as is practicable.

After the terminal has been inserted in the hole and the compressor mounted on the rail, the inner screw is centered in the depression in the bond terminal. The outer screw is then drawn up with the handwheel until it rests against the rail web, thus holding the machine rigid and drawing the bond head up tight against the opposite side of the web. Compression is then effected with the wrench on the inner screw.

The end of the compressing screw is so designed that the hole in the rail must be completely filled with copper before the terminal can be riveted or button-headed over the hole.

The handwheel may be detached easily and discarded when work is to be done in limited space, as over ties, as the outer screw is provided with a hexagonal end to take a wrench.

The compressing power of these machines is from 20 to 30 tons.

Cat. No. 68935 is designed to take the lighter rails from 30 to 40 lb. It has a vertical adjusting screw to center the compressing screw in the depression in the bond terminal. Power exerted 15 tons.

All compressors are furnished with operating wrench. Extra wrenches may be ordered by catalogue number.

Cat. No.	Used With	Diameter of Terminal up to	Top of Jaw to Center of Screw	Weight in Lb.
61040	T Rails, 5" and under	$\frac{7}{8}$ "	$3\frac{1}{8}$ "	51
103485	T Rails, 5" and under	$1\frac{1}{8}$ "	$3\frac{1}{8}$ "	68
61041	T and Girder Rails, 7" and under	$\frac{7}{8}$ "	$4\frac{1}{8}$ "	82
61042	T and Girder Rails, 9" and under	$\frac{7}{8}$ "	7"	110
103486	T and Girder Rails, 9" and under	$1\frac{1}{8}$ "	7"	122
68935	T Rails 30 to 40 lbs.	$\frac{3}{4}$ "	$2\frac{1}{8}$ "	30

WRENCHES FOR COMPRESSORS

Cat. No.	Description	Weight in Lb.
68936	24" Wrench for Compressor No. 68935	6
61180	40" Wrench for Compressors Nos. 61040, 61041 and 61042	13
103487	42" Wrench for Compressors Nos. 103485 and 103486	15

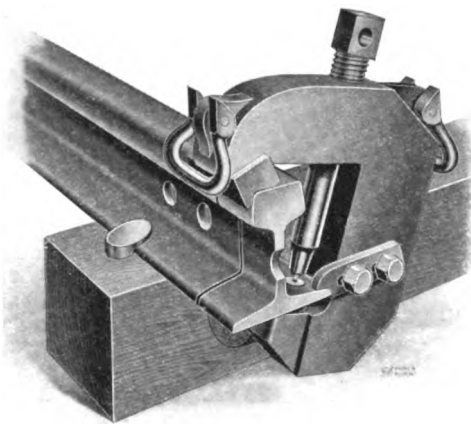
RAIL BONDS

PARTS OF SCREW COMPRESSORS

Cat. No.	Description	Weight in Lb.
103488	Inner Screw only for Compressors Nos. 61040, 61041 and 61042	5
103491	Outer Screw only for Compressors Nos. 61040, 61041 and 61042	3
103489	Inner Screw only for Compressors Nos. 103485 and 103486	8
103492	Outer Screw only for Compressors Nos. 103485 and 103486	5
103490	Inner Screw only for Compressor No. 68935	5
103493	Outer Screw only for Compressor No. 68935	3
103494	Frame only for Compressor No. 61040	40
103495	Frame only for Compressor No. 103485	52
103496	Frame only for Compressor No. 61041	71
103497	Frame only for Compressor No. 61042	99
103498	Frame only for Compressor No. 103486	106
103499	Frame only for Compressor No. 68935	22
103500	Handwheel only for all compressors except No. 68935*	3

*Compressor No. 68935 has no provision for handwheel.

SCREW COMPRESSOR FOR FOOT BONDS



Cat. No. 40294

This compressor is used for installing the Form C Beveled Head Foot Bond. The bond holes are drilled or punched at right angles to the upper surface of the foot of the rail.

The body or frame is made of forged steel. The compressing screw is of tool steel with square cut threads, and is carefully tempered. Two handles are provided for conveniently carrying the tool about. The tightening wedge is attached to the frame by a chain to prevent loss. When ordering this machine please give section number of rail used.

The compressor weighs 80 lbs.

Cat. No.	Description
40294	Foot Bond Screw Compressor

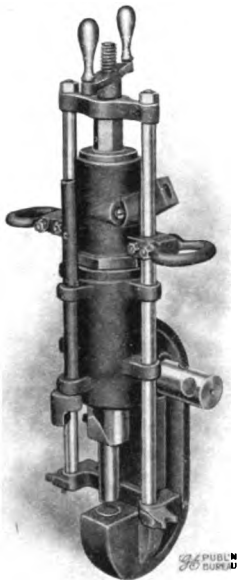
PARTS OF FOOT BOND COMPRESSOR

Cat. No.	Description	Weight in Lb.
103501	Frame only	66
103502	Compressing Screw only	9
103503	Tightening Wedge only *	5

*When ordering Tightening Wedge please give section number of rail used.

RAIL BONDS

HYDRAULIC FOOT BOND COMPRESSOR



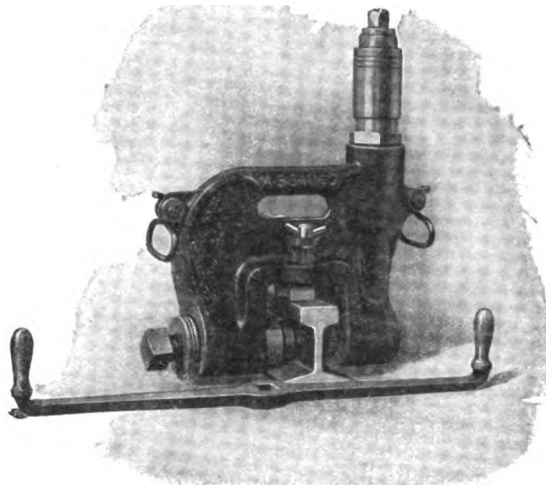
This is the companion tool to the Foot Bond Punch illustrated on page 158. It is intended for the installation of Form C Beveled Head Foot Bonds. The holes in the rail are tapered with the large aperture at the top; the bond terminals are inserted from beneath the rail, and compressed backward against the taper, forming an absolutely water-tight and flush joint, and a perfect contact. The bonds are drawn into place before being compressed, by means of the crank and side bars. A guide plate is attached to the lower end of these side bars to indicate the proper location of the tool and insure the ram being directly over the bond. Weight complete, 135 pounds.

Cat. No.	Description
40296	Hydraulic Conductor Bond Compressor, 35 tons

Cat. No. 40296

SCREW HYDRAULIC WEB BOND COMPRESSOR

This tool is designed for compressing the terminals of bonds in the web of T or girder rails.



Cat. No.	Description	Weight in Lb.
108051	Hydraulic Web Bond Compressor for T Rails up to 100 lbs. per yd.	115
108482	Hydraulic Web Bond Compressor for Girder Rails up to 7" high	160
108483	Hydraulic Web Bond Compressor for Girder Rails up to 9" high	190

RAIL BONDS

HYDRAULIC CONDUCTOR BOND COMPRESSORS

For Use in Underground Conduit Work

This tool is designed for compressing bond terminals in conductor rails for underground contact systems. In such work one end of the bond is compressed in the rail while it is lying loose in the street; this tool is intended for that part of the work. After the rail is in place and fixed on its insulators, the remaining bond terminal is compressed with the special tool shown below.

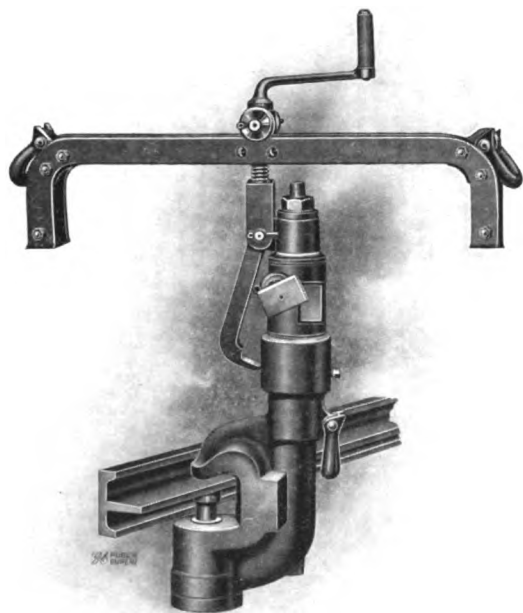
Cat. No.	Description
40298	Hydraulic Conductor Bond Compressor, weight 110 pounds, capacity 15 tons



Cat. No. 40298

For Use in Manhole

This compressor is designed for compressing the bond terminals in underground conductor rails after they are set in position in conduit. The tool is dropped into position through the manhole, and is supported by means of the cross bar which extends across the hole. It is drawn up tight against the rail with the crank and screw, and the hook catching in the slot holds the tool firmly during operation. Weight, 110 lbs.; capacity, 15 tons.



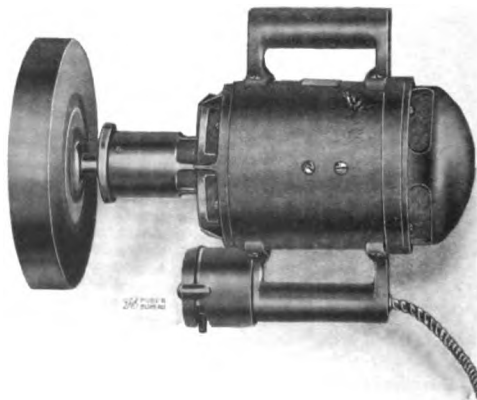
Cat. No. 40299

Cat. No.	Description
40299	Hydraulic Conductor Bond Compressor

DUNTLEY PORTABLE ELECTRIC GRINDER FOR 460 TO 600 VOLT CIRCUITS

For grinding rails for bonds, either soldered or otherwise fastened, we are offering a portable electric grinder that will accomplish a very large amount of work at a rapid rate. This tool is light, absolutely portable, and can be handled by a comparatively inexperienced operator.

The grinder carries an emery wheel 8 in. in diameter, and $\frac{5}{8}$ in. face. The speed of the tool is 3,000 r.p.m. and the weight complete is 28 lbs. It is regularly equipped with an 8 in. in diameter by $\frac{5}{8}$ in. face emery wheel, and two 20-ft. lengths of cable attached to the grinder. The switch is mounted on the machine within easy reach of the hand.



RAIL BONDS

DUNTLEY PORTABLE ELECTRIC GRINDER—(Concluded)
FOR 460 TO 600 VOLT CIRCUIT

Cat. No.	Description	Weight in Lb.
103477	Portable Electric Grinder	28

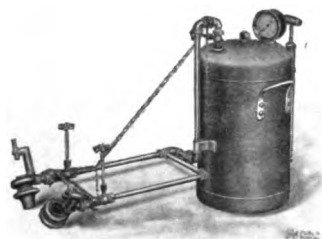
HAND POWER GRINDING MACHINE



Rail Grinding Machine

This machine is simple in construction, compact and light. It may be carried readily by two men. The legs and handles are iron pipe. It is equipped with a flexible shaft and an emery wheel 8 in. in diameter with $\frac{5}{8}$ in. face.

Cat. No.	Description
103478	Grinding Machine with 5 ft. flexible shaft
103479	Flexible Shaft only, 5 ft. long
103480	Emery Wheel only, $\frac{5}{8}$ " x 8"
103481	Carborundum Wheel only, $\frac{5}{8}$ " x 8"



TORCH

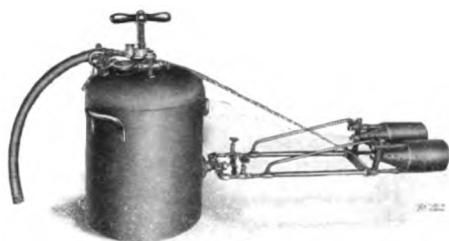
For kerosene burning this machine is equipped with two powerful burners, mounted on a 10 gallon brazed tank, tested at 200 lbs. pressure per square inch. The burners are mounted on swivel joints, and are easily adjustable to any position.

For gasolene burning the machine is equipped with a large single burner of great power.

Cat. No. 103482

Cat. No.	Description	Weight in Lb.
43688	Gasolene Torch 10 gallons	60
103482	Kerosene Torch 10 gallons	75

RAIL BONDS BLOW TORCHES



Cat. No. 43689

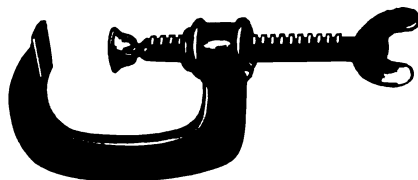


Cat. No. 43690

Cat. No. 43689 is a Kerosene Torch, capacity 15 gals. It will heat a rail to soldering temperature in one-fourth the time required with Gasoline Torch. It may be refilled without exhausting the pressure in the tank. Cat. No. 43690 is the same as Cat. No. 43689 except that it has flexible hose instead of pipe connections, adapting it for use on elevated structures, etc.

Cat. No.	Description	Weight in Lb.
43689	Kerosene Torch with pipe connected burners	105
43690	Kerosene Torch with flexible hose	115

SOLDERED BOND CLAMPS

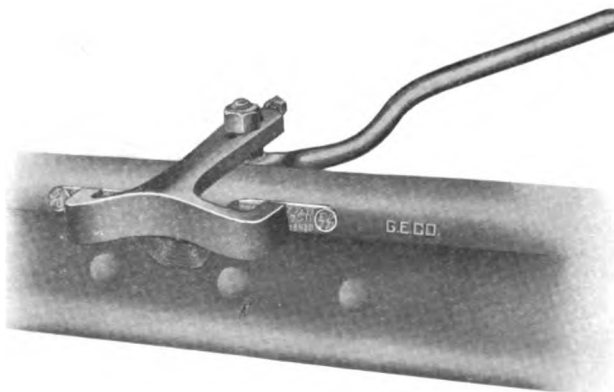


Cat. No.

Description

103483

Clamp for Forms AS, BBS and DS Soldered Bonds

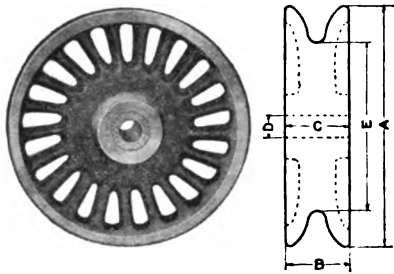


103484

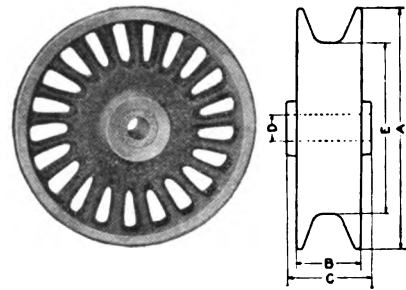
Clamp for Form BS Soldered Bonds

UNION STANDARD TROLLEY WHEELS

In general the Form 6 Trolley Wheel is recommended for city service and the Form 17 for high speed interurban equipments. Other wheels suited to various exceptional conditions are also listed.



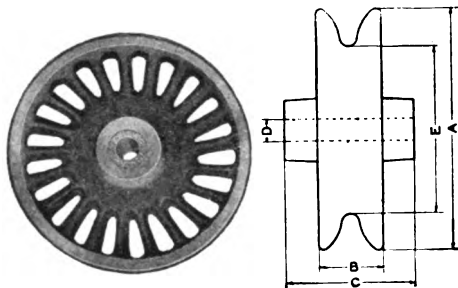
Cat. No. 66054



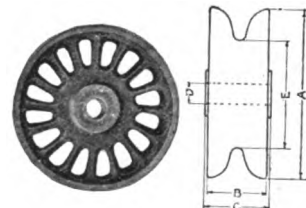
Cat. No. 66055

Form 1 Sleet Wheel—weight 4 lb. 1 oz.—used with Form 15 harp having $\frac{3}{8}$ in. axle pin. Equipped with graphite bushing.

Form 2 Sleet Wheel—weight 4 lb. 2 oz.—used with Form 12 harp. Equipped with graphite bushing.



Cat. No. 66056



Cat. No. 3930

Form 3 Sleet Wheel—weight 4 lb. 4 oz.—used with Form 21 high speed harp, Cat. No. 39452. Equipped with graphite bushing.

Form 4 Sleet Wheel—weight 1 lb. 11 oz.—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing.

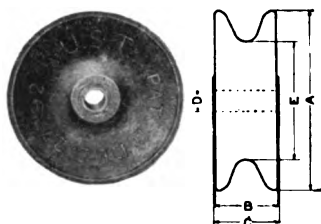
DIMENSIONS

DIMENSIONS IN INCHES							Design	Used with Harp Form	Weight
Cat. No.	Form Number	*A Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter			
66054	1	5 $\frac{3}{8}$	1 $\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{3}{8}$	3 $\frac{1}{4}$	Sleet	†15	4 lb. 1 oz.
66055	2	5 $\frac{3}{8}$	1 $\frac{1}{8}$	2	$\frac{3}{8}$	3 $\frac{1}{4}$	Sleet	12	4 lb. 2 oz.
66056	3	5 $\frac{3}{8}$	1 $\frac{1}{8}$	3	$\frac{3}{8}$	3 $\frac{1}{4}$	Sleet	21	4 lb. 4 oz.
3930	4	4	1 $\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{1}{4}$	Sleet	1, 2, 6, 7 and 18	1 lb. 11 oz.

*To obtain depth of trolley wheel groove, subtract dimension E, groove diameter, from dimension A, outside diameter and take one-half the result.

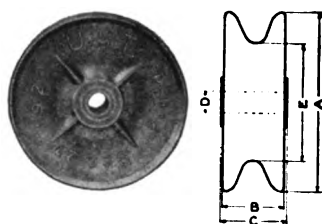
†Form 15 Harp Cat. No. 66067 having $\frac{3}{8}$ in. axle pin.

UNION STANDARD TROLLEY WHEELS



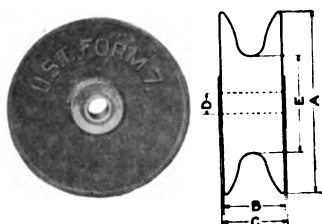
Cat. No. 3925

Form 5 Trolley Wheel—weight 2 lb. 9 oz.—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing.



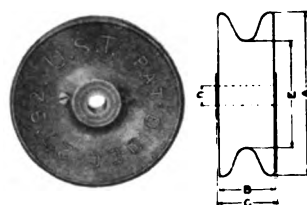
Cat. No. 3923

Form 6 Trolley Wheel—weight 2 lb. 3 oz.—is furnished as standard on equipments for city service—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing.



Cat. No. 3929

Form 7 Trolley Wheel—weight 2 lb. 15 oz.—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing.



Cat. No. 3928

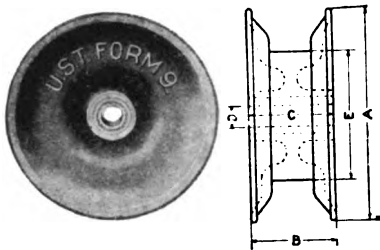
Form 8 Trolley Wheel—weight 2 lb. 8 oz.—used with Forms 6 and 7 harps. Equipped with graphite bushing and oil reservoir.

DIMENSIONS

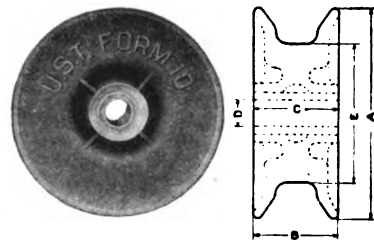
Cat. No.	Form Number	DIMENSIONS IN INCHES					Design	Used with Harp Form	Weight
		*A Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter			
3925	5	4½	1⅞	1½	½	2½		1, 2, 6, 7 and 18	2 lb. 9 oz.
3923	6	4½	1⅞	1½	½	2½		1, 2, 6, 7 and 18	2 lb. 3 oz.
3929	7	4½	1⅞	1½	½	2½		1, 2, 6, 7 and 18	2 lb. 15 oz.
3928	8	4½	1⅞	1½	½	2½	Self-Oiling	6 and 7	2 lb. 8 oz.

*To obtain depth of trolley wheel groove, subtract dimension E, groove diameter, from dimension A, outside diameter, and take one-half the result.

UNION STANDARD TROLLEY WHEELS



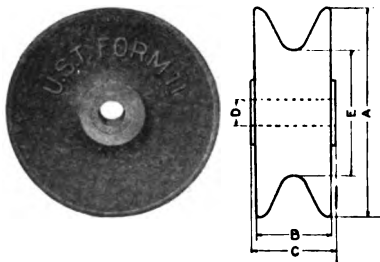
Cat. No. 19314



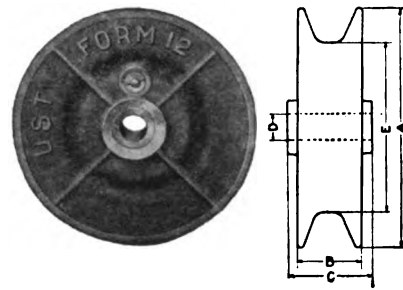
Cat. No. 3927

Form 9 Trolley Wheel—weight 2 lb. 6 oz.—used with Form 9 harp, Cat. No. 19312. Equipped with graphite bushing.

Form 10 High Speed Trolley Wheel—weight 5 lb. 6 oz.—used with Form 10 harp, Cat. No. 26060. Equipped with graphite bushing.



Cat. No. 26059



Cat. No. 26158

Form 11 Trolley Wheel—weight 4 lb. 14 oz.—used with the Form 11 harp, Cat. No. 26061. Equipped with the graphite bushing.

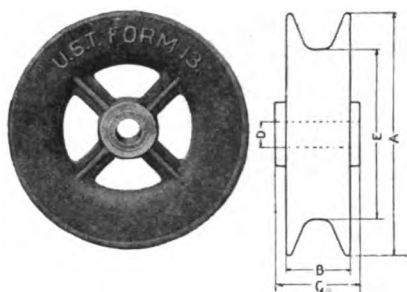
Form 12 High Speed Trolley Wheel—weight 5 lb. 8 oz.—used with the Form 12 high speed harp, Cat. No. 26159. Equipped with graphite bushing and oil reservoir.

DIMENSIONS

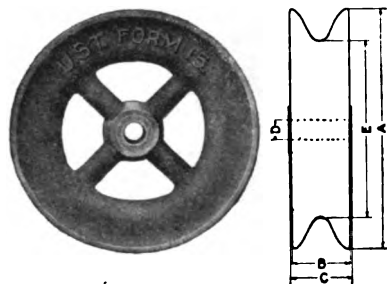
Cat. No.	Form Number	DIMENSIONS IN INCHES					Design	Used with Harp Form	Weight
		*A Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter			
19314	9	5	2	2	$\frac{1}{2}$	3		9	2 lb. 6 oz.
3927	10	5	2	2	$\frac{1}{2}$	$3\frac{1}{4}$		10	5 lb. 6 oz.
26059	11	5	$1\frac{1}{2}$	2	$\frac{1}{2}$	3	Self-Oiling	11	4 lb. 14 oz.
26158	12	$5\frac{1}{2}$	$1\frac{1}{2}$	2	$\frac{1}{2}$	4	Self-Oiling	12	5 lb. 8 oz.

*To obtain depth of trolley wheel groove subtract dimension E, groove diameter, from dimension A, outside diameter, and take one-half the result.

UNION STANDARD TROLLEY WHEELS



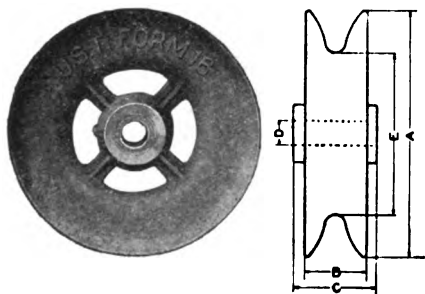
Cat. No. 30600



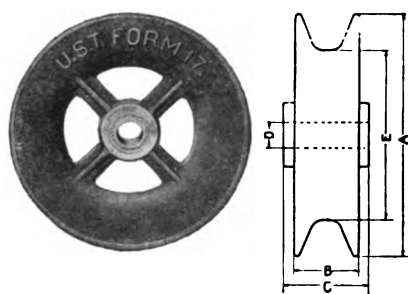
Cat. No. 66057

Form 13 High Speed Trolley Wheel—weight 5 lb. 6 oz.—used with the Form 12 high speed harp, Cat. No. 26159. Equipped with graphite bushing.

Form 15 High Speed Trolley Wheel—weight 4 lb. 6 oz.—used with the Form 15 harp having $\frac{1}{2}$ in. axle pin, Cat. No. 66066. Equipped with graphite bushing.



Cat. No. 66058



Cat. No. 33611

Form 16 High Speed Trolley Wheel—weight 5 lb. 2 oz.—used with the Form 16 harp, Cat. No. 66068. Equipped with graphite bushing and oil reservoir.

Form 17 (Standard) High Speed Trolley Wheel, weight 4 lb. 6 oz. Furnished as standard for high speed equipments. Used with the Form 12 high speed harp, Cat. No. 26159. Equipped with graphite bushing.

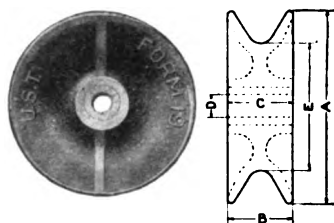
DIMENSIONS

Cat. No.	Form Number	DIMENSIONS IN INCHES					Design	Used with Harp Form	Weight
		*2 Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter			
30600	13	5 $\frac{1}{2}$	1 $\frac{1}{2}$	2	$\frac{1}{2}$	4 $\frac{1}{2}$	Self-Oiling	12	5 lb. 6 oz.
66057	15	6	1 $\frac{1}{8}$	1 $\frac{1}{2}$	$\frac{1}{2}$	4 $\frac{1}{8}$		†15	4 lb. 6 oz.
66058	16	6	1 $\frac{1}{2}$	2	$\frac{1}{2}$	4		16	5 lb. 2 oz.
33611	17	5 $\frac{1}{2}$	1 $\frac{1}{2}$	2	$\frac{1}{2}$	4 $\frac{1}{2}$		12	4 lb. 6 oz.

*To obtain depth of trolley wheel groove subtract dimension E, groove diameter, from dimension A, outside diameter, and take one-half the result.

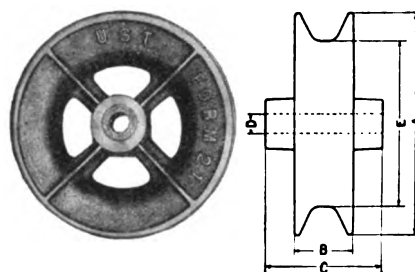
†Form 15 Harp Cat. No. 66066 having $\frac{1}{2}$ in. axle pin.

UNION STANDARD TROLLEY WHEELS



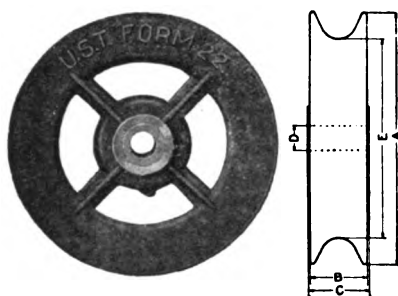
Cat. No. 66059

Form 19 Trolley Wheel—weight 3 lb. 4 oz.—used with the Form 19 harp, Cat. No. 66070. Equipped with graphite bushing.



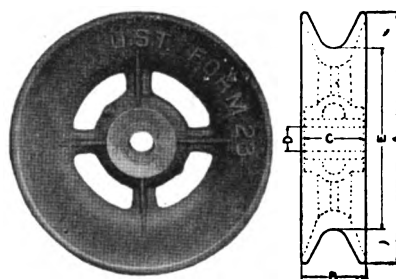
Cat. No. 39451

Form 21 High Speed Trolley Wheel—weight 5 lb. 6 oz.—used with the Form 21 harp, Cat. No. 39452. Equipped with graphite bushing.



Cat. No. 66060

Form 22 High Speed Trolley Wheel—weight 4 lb. 2 oz.—used with the Form 15 harp having $\frac{1}{8}$ in. axle pin, Cat. No. 66067. Equipped with graphite bushing and oil reservoir.



Cat. No. 66061

Form 23 High Speed Trolley Wheel—weight 4 lb. 2 oz.—used with the Form 15 harp having $\frac{1}{8}$ in. axle pin, Cat. No. 66067. Equipped with graphite bushing and oil reservoir.

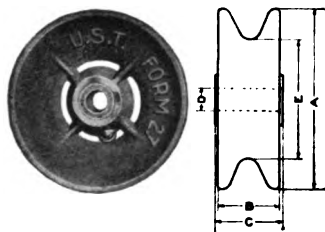
DIMENSIONS

Cat. No.	Form Number	DIMENSIONS IN INCHES					Design	Used with Harp Form	Weight
		*A Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter			
66059	19	4 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	3		19	3 lb. 4 oz.
39451	21	5 $\frac{1}{2}$	1 $\frac{1}{2}$	3	$\frac{1}{2}$	4 $\frac{1}{2}$		21	5 lb. 6 oz.
66060	22	6 $\frac{1}{2}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$	$\frac{1}{2}$	5	Self-Oiling	†15	4 lb. 2 oz.
66061	23	6 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	4 $\frac{1}{4}$	Self-Oiling	†15	4 lb. 2 oz.

*To obtain depth of trolley wheel groove, subtract dimension E, groove diameter, from dimension A, outside diameter, and take one-half the result.

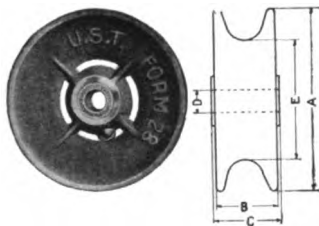
†Form 15 harp Cat. No. 66067 having $\frac{1}{8}$ in. axle pin.

UNION STANDARD TROLLEY WHEELS



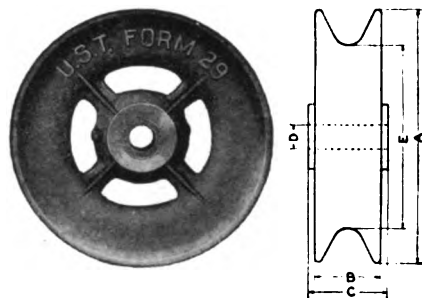
Cat. No. 66062

Form 27 Trolley Wheel—weight 2 lb. 7 oz.—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing and oil reservoir.



Cat. No. 66063

Form 28 Trolley Wheel—weight 2 lb. 7 oz.—used with Forms 1, 2, 6, 7 and 18 harps. Equipped with graphite bushing and oil reservoir.



Cat. No. 66064

Form 29 High Speed Trolley Wheel—weight 4 lb. 3 oz.—used with the Form 12 harp, Cat. No. 26159. Equipped with graphite bushing and oil reservoir.

DIMENSIONS

DIMENSIONS IN INCHES									
Cat. No.	Form Number	*A Outside Diameter	B Width Flanges	C Length Through Hubs	D Size Bore	*E Groove Diameter	Design	Used with Harp Form	Weight
66062	27	4 $\frac{1}{4}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{3}{4}$	Self-Oiling	1, 2, 6, 7, 18	2 lb. 7 oz.
66063	28	4 $\frac{1}{4}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$	$\frac{1}{2}$	2 $\frac{3}{4}$	Self-Oiling	1, 2, 6, 7, 18	2 lb. 7 oz.
66064	29	6 $\frac{1}{2}$	1 $\frac{1}{2}$	2	$\frac{1}{2}$	4 $\frac{1}{4}$	Self-Oiling	12	4 lb. 3 oz.

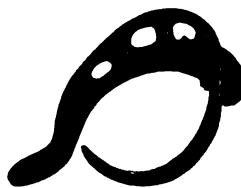
*To obtain depth of trolley wheel groove subtract dimension E, groove diameter, from dimension A, outside diameter, and take one-half the result.

SLEET CUTTERS

The Sleet Cutter consists of a casting of metal similar to that from which our trolley wheels are manufactured. The lower tongue of the casting fits into the bottom of the harp while the phosphor-bronze spring presses against the wheel tread. Cat. No. 45149 is recommended for use with standard 4 $\frac{1}{4}$ in. trolley wheel (Form 6) while Cat. No. 45150 is adapted for use with wheels from 5 in. to 5 $\frac{3}{4}$ in. in diameter (Forms 10-12-17-21).



Cat. No. 45150



Cat. No. 45149

They are not intended for continuous operation. One or two trips are generally sufficient to clean the wire, so that normal operation of trolley wheel can be resumed.

The chief advantage which this type of sleet cutter possesses over the sleet cutting wheel is that it can easily be applied to harp and wheel without the use of tools.

No difficulty will be experienced in operating these sleet cutters under frogs and crossings.

Cat. No.	Description	Approx. Weight per 100
45149	Sleet Cutter for wheels approx. 4 $\frac{1}{4}$ " diameter.	
45150	Sleet Cutter for wheels approx. 5 $\frac{1}{4}$ " diameter.	
59943	Sleet Cutter spring	

UNION STANDARD TROLLEY HARPS

Of the U. S. Trolley Harps here described, the Form 6 is considered standard for city service, and the Form 12 for high speed interurban equipments. All the harps are of malleable iron.



Cat. No. 17226

Form 1 Trolley Harp is for use with a wooden pole. Takes the Form 4 Sleet Wheel and the Forms 5, 6, 7, 8, 27 and 28 Trolley Wheels.



Cat. No. 66065

Form 2 Trolley Harp—weight, 2 lb. 8 oz.—takes the Form 4 Sleet Wheel and the Forms 5, 6, 7, 8, 27 and 28 Trolley Wheels.



Cat. No. 3918

Form 6 Trolley Harp—weight, 2 lb.—furnished as standard with equipments for city service. Takes the Form 4 Sleet Wheel and the Forms 5, 6, 7, 8, 27 and 28 Trolley Wheels.



Cat. No. 3924

Form 7 Brass Trolley Harp—weight, 2 lb. 4 oz.—takes the Form 4 Sleet Wheel and the Forms 5, 6, 7, 8, 27 and 28 Trolley Wheels.



Cat. No. 19312

Form 9 Trolley Harp—weight, 2 lb.—for high speed service. Takes the Form 9 Trolley Wheel.



Cat. No. 26060

Form 10 Trolley Harp—weight, 2 lb. 8 oz.—for high speed service. Takes the Form 10 high speed Trolley Wheel.

DIMENSIONS

Cat. No.	Form Number	DIMENSIONS IN INCHES			Used With the Following Wheels Form Number	Weight
		Width Between Washers	Diameter Axle Pin	Maximum Diameter Wheel		
17226	1 (Wood Pole)	1½	½	4½	4, 5, 6, 7, 8, 27, 28	
66065	2 (Towle)	1½	½	4½	4, 5, 6, 7, 8, 27, 28	2 lb. 8 oz.
3918	6 (Standard Malleable)	1½	½	4½	4, 5, 6, 7, 8, 27, 28	2 lb.
3924	7 (Standard Brass)	1½	½	4½	4, 5, 6, 7, 8, 27, 28	2 lb. 4 oz.
19312	9	2	¾	6	9	2 lb.
26060	10	2	¾	5½	10	2 lb. 8 oz.

UNION STANDARD TROLLEY HARPS



Cat. No. 26061

Form 11 Trolley Harp—weight, 2 lb. 3 oz.—takes Form 11 Trolley Wheel.



Cat. No. 26159

Form 12 High Speed Trolley Harp—weight, 2 lb. 8 oz.—furnished as standard with high speed equipments. Takes the Form 2 Sleet Wheel and the Forms 12, 13, 29 and 17 high speed Trolley Wheels.



Cat. No. 66066

Form 15 High Speed Trolley Harp having $\frac{1}{2}$ in. axle pin—weight, 2 lb.—takes Form 15 high speed Trolley Wheel.



Cat. No. 66067

Form 15 High Speed Trolley Harp having $\frac{3}{8}$ in. axle pin—weight, 2 lb.—takes Form 1 Sleet Wheel and the Forms 22 and 23 high speed Trolley Wheels.



Cat. No. 66068

Form 16 High Speed Trolley Harp—weight, 2 lb. 8 oz.—takes Form 16 high speed Trolley Wheel.



Cat. No. 66069

Form 18 Trolley Harp—weight, 2 lb. 8 oz.—takes Form 4 Sleet Wheel and the Forms 5, 6, 7, 8, 27 and 28 Trolley Wheels.



Cat. No. 66070

Form 19 Trolley Harp—weight, 2 lb. 8 oz.—takes Form 19 Trolley Wheel.



Cat. No. 39452

Form 21 High Speed Trolley Harp—weight, 3 lb. 4 oz.—for high speed service. Takes Form 3 Sleet Wheel and Form 21 high speed Trolley Wheel.

DIMENSIONS

Cat. No.	Form Number	DIMENSIONS IN INCHES			Used With the Following Wheels Form Number	Weight
		Width Between Washers	Diameter Axle Pin	Maximum Diameter Wheel		
26061	11	2	$5\frac{1}{4}$	$5\frac{1}{4}$	11	2 lb. 3 oz.
26159	12	2	$5\frac{1}{4}$	6	2, 12, 13, 17, 29	2 lb. 8 oz.
66066	15	$1\frac{1}{2}$	$5\frac{1}{4}$	7	15	2 lb.
66067	15	$1\frac{1}{2}$	$5\frac{1}{4}$	7	1, 22, 23	2 lb.
66068	16	2	$5\frac{1}{4}$	6	16	2 lb. 8 oz.
66069	18	$1\frac{1}{2}$	$5\frac{1}{4}$	$4\frac{1}{2}$	4, 5, 6, 7, 8, 27, 28	2 lb. 8 oz.
66070	19	$1\frac{1}{2}$	$5\frac{1}{4}$	5	19	2 lb. 8 oz.
39452	21	3	$5\frac{1}{4}$	$5\frac{1}{4}$	3, 21	3 lb. 4 oz.

UNION STANDARD TROLLEY HARPS AND POLES

REPAIR PARTS

Cat. No.	Description
3919	Form 6 harp contact spring, per 100
3920	Form 6 harp contact washer, per 100
26072	Form 10 harp contact spring, per 100
26073	Form 10 harp contact washer, per 100
30601	Forms 12 and 21 harp contact spring, per 100
30602	Forms 12 and 21 harp contact washer, per 100
3921	Axle pin ($\frac{1}{2}$ " by $2\frac{1}{2}$ ") for Forms 4, 5, 6, 7 and 8 trolley wheels
39454	Axle pin ($\frac{1}{2}$ " by $3\frac{1}{4}$ ") for Forms 10 and 11 trolley wheels
39455	Axle pin ($\frac{1}{2}$ " by $3\frac{1}{2}$ ") for Forms 12 and 17 trolley wheels
39456	Axle pin ($\frac{1}{2}$ " by $4\frac{1}{2}$ ") for Form 21 trolley wheel
*3922	Bushing ($\frac{1}{8}$ " bore) for Forms 4, 6 and 21 trolley wheels
3950	Bushing ($\frac{1}{8}$ " bore) for Forms 10, 12 and 17 trolley wheels
16475	Rope swivel
15207	Spring cotter pin for axle ($\frac{1}{2}$ " by $1\frac{1}{4}$ ") per 100
26078	Harp contact spring rivet, per lb.
16352	Trolley cord, per 20 ft. lengths

*Form 21 Trolley Wheel requires 2 bushings.

UNION STANDARD TROLLEY POLES

U. S. Trolley Poles are made of cold-drawn seamless tubing of the highest grade to be obtained. The reinforcement, $16\frac{1}{2}$ in. in length of the same material as the pole proper, is inserted cold with such care as to practically become a part of the pole. The taper begins 3 ft. from the top and reduces the diameter from $1\frac{1}{2}$ in. at this point to 1 in. at the end. The deflection of a 12-ft. pole under transverse stress with a 43-pound weight at the end is 10 inches, with no permanent set. Of great importance is the fact that these seamless poles are several pounds lighter than poles of lapweld steel.

Cat. No.	Length of Pole	Out. Diam. at Butt in In.	Approx. Weight in Lb.
61920	11 ft. 4 in.	$1\frac{1}{2}$	19
61921	12 ft.	$1\frac{1}{2}$	20
61922	12 ft. 4 in.	$1\frac{1}{2}$	20.5
61923	13 ft.	$1\frac{1}{2}$	21.5
61924	13 ft. 4 in.	$1\frac{1}{2}$	22.5
61925	14 ft.	$1\frac{1}{2}$	23.5
61926	14 ft. 4 in.	$1\frac{1}{2}$	24
61927	15 ft.	$1\frac{1}{2}$	24.5
61928	15 ft. 4 in.	$1\frac{1}{2}$	25
61929	16 ft.	$1\frac{1}{2}$	26.5
61930	16 ft. 4 in.	$1\frac{1}{2}$	27
61931	17 ft.	$1\frac{1}{2}$	28.5
61932	17 ft. 4 in.	$1\frac{1}{2}$	30

UNION STANDARD TROLLEY POLES WITH HARPS

Length of trolley pole complete is measured from butt of pole to center of axle hole in harp.

STEEL TROLLEY POLES (1½ IN. DIAM. AT BASE) COMPLETE FOR USE WITH Nos. 1, 3, 5, 6, 7, 10, 11, 13 AND 14 TROLLEY BASES

Cat. No.	Description	Length in Ft. Butt to Axle Hole of Harp
59287	Pole with Form 6 harp complete	12
59288	Pole with Form 10 high speed harp complete	12
59289	Pole with Form 12 high speed harp complete	12
59290	Pole with Form 21 high speed harp complete	12
59291	Pole with Form 6 harp complete	13
59292	Pole with Form 10 high speed harp complete	13
59293	Pole with Form 12 high speed harp complete	13
59294	Pole with Form 21 high speed harp complete	13
<i>The following poles are not guaranteed for successful operation with the above bases, but if ordered will be furnished upon customer's responsibility.</i>		
59295	Pole with Form 6 harp complete	14
59296	Pole with Form 10 high speed harp complete	14
59297	Pole with Form 12 high speed harp complete	14
59298	Pole with Form 21 high speed harp complete	14
59299	Pole with Form 6 harp complete	15
59300	Pole with Form 10 high speed harp complete	15
59301	Pole with Form 12 high speed harp complete	15
59302	Pole with Form 21 high speed harp complete	15
59303	Pole with Form 6 harp complete	16
59304	Pole with Form 10 high speed harp complete	16
59305	Pole with Form 12 high speed harp complete	16
59306	Pole with Form 21 high speed harp complete	16

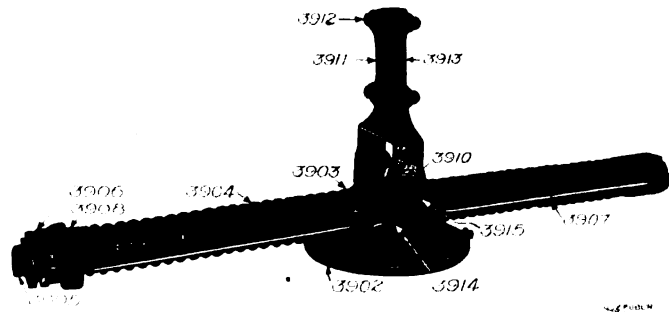
STEEL TROLLEY POLES (2 IN. DIAM. AT BASE) COMPLETE FOR USE WITH Nos. 8 AND 10 TROLLEY BASES

Cat. No.	Description	Length in Ft. Butt to Axle Hole of Harp
59307	Pole with Form 6 harp complete	15
59308	Pole with Form 10 high speed harp complete	15
59309	Pole with Form 12 high speed harp complete	15
59310	Pole with Form 21 high speed harp complete	15
59311	Pole with Form 6 harp complete	16
59312	Pole with Form 10 high speed harp complete	16
59313	Pole with Form 12 high speed harp complete	16
59314	Pole with Form 21 high speed harp complete	16
59315	Pole with Form 6 harp complete	17
59316	Pole with Form 10 high speed harp complete	17
59317	Pole with Form 12 high speed harp complete	17
59318	Pole with Form 21 high speed harp complete	17
59319	Pole with Form 6 harp complete	18
59320	Pole with Form 10 high speed harp complete	18
59321	Pole with Form 12 high speed harp complete	18
59322	Pole with Form 21 high speed harp complete	18

UNION STANDARD TROLLEY BASES

*No. 1 TROLLEY BASE

Approximate Weight, 104 lbs.



*The maximum length of pole to allow of successful operation of this base is 13 feet. If longer pole is desired, the General Electric Company must decline the responsibility for the successful operation of the trolley. Poles 1½ in. diameter at base.

By adjusting the compression springs, the pressure on the trolley wire may be varied from 12 to 25 lbs., with a 12 ft. pole, standard harp, and Form 6 wheel, at an angle of 45 degrees.

Cat. No.	Description
3901	Trolley base, without pole
3902	Stand or foot, with terminal binding screws
3903	Swivel
3904	Compression spring, (4 required)
3905	Spring guide, (2 required)
3906	Nut for spring guide, (4 required)
3907	Side rod, with nuts, (4 required)
3908	End yoke, (2 required)
3909	Pole socket, complete, with legs and pole clamp
3910	Pole socket axle pin, with cotter, (2 required)
3911	Pole socket clamp
3912	Bolt and nut for pole clamp, (4 required)
3913	Pole socket body
3914	Pole socket leg, (2 required)
3915	Pole socket leg pin, with cotter, (4 required)

The U. S. 1 Base is used only where the trolley pole cannot be reversed by swivelling.

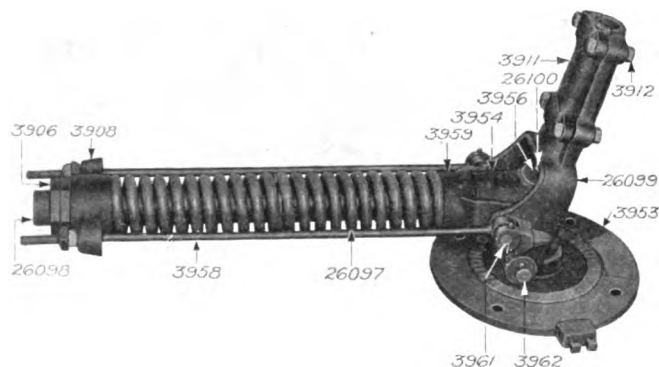
***No. 5 TROLLEY BASE**

Cat. No.	Description
17499	Trolley base, without pole
17555	Stand or foot, with terminal binding clamp and screws
18205	Terminal binding clamp
13868	Cap screw for terminal binding clamp, (2 required)
18213	Pole socket axle pin
16323	Cotter for pole socket axle pin
18204	Buffer spring
18201	Buffer
18207	Band, (2 required)
13866	Rivet for band
26095	Pole socket, complete
18211	Pole socket clamp
15910	Bolt and nut for pole socket, (4 required)
17554	Swivel pin
10579	Cotter for swivel pin
18208	Spring holder, strap end
18209	Spring holder, eye bolt end
18202	Cover for hub
18214	Tension spring, (6 required)
18206	Eye bolt with nuts
16074	Nut for eye bolt
13867	Rivet for swivel pin
18200	Arm or swivel

UNION STANDARD TROLLEY BASES

*No. 6 TROLLEY BASE

Approximate Weight, 82 lbs.



*The maximum length of pole to allow of successful operation of this base is 13 feet. If longer pole is desired, the General Electric Company must decline the responsibility for the successful operation of the trolley. Poles 1½ in. diameter at base.

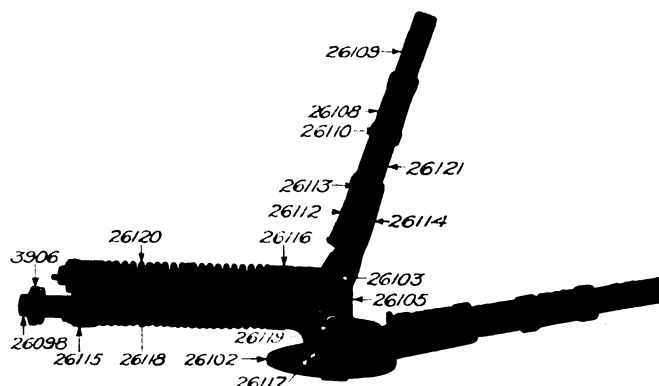
By adjusting the compression spring the pressure on the trolley wire may be varied from 10 to 30 lbs. with a 12 ft. pole, standard harp and Form 6 wheel at an angle of 45 degrees.

Cat. No.	Description
3934	Trolley Base, without pole
3953	Stand or foot, with terminal binding screws
3954	Swivel with brass bushing
26096	Brass bushing for swivel
26097	Compression spring, (2 required)
26098	Spring guide
3906	Nut for spring guide, (2 required)
3958	Side rod with nuts, (2 required)
3961	Side rod pin with cotter, (2 required)
3960	Pole socket, complete
26099	Pole socket body
3911	Pole socket clamp
3912	Bolt and nut for clamp, (4 required)
3962	Pole socket axle pin with cotters
3956	Brass washer for stand or foot
26100	Cap screw for stand or foot
3959	Buffer
3908	End yoke

UNION STANDARD TROLLEY BASES

*No. 7 TROLLEY BASE

Approximate Weight, 197 lbs.



*The maximum length of pole to allow of successful operation of this base is 12 feet. If longer pole is desired, the General Electric Company must decline the responsibility for the successful operation of the trolley. Poles $1\frac{1}{4}$ in. diameter at base.

By adjusting the compression springs the pressure on the trolley wires may be varied from 10 to 30 lbs. with a 12 ft. pole, standard harp and Form 6 wheel at an angle of 45 degrees.

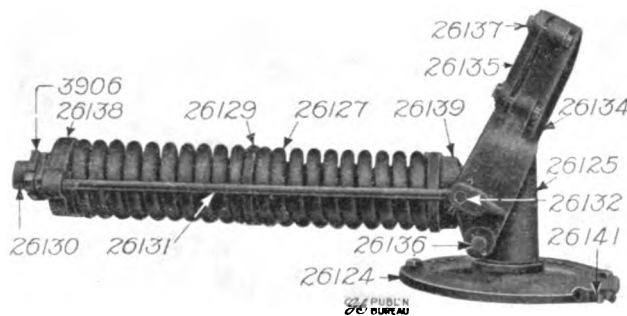
Cat. No.	Description
26101	Trolley base (double), without poles
26102	Stand or foot
26103	Swivel pin for stand or foot
26104	Brass bushing for swivel pin
26105	Swivel or frame, with brass bushing
26106	Brass bushing for swivel
26107	Upper pole socket, complete
26108	Upper pole socket clamp (large)
26109	Upper pole socket clamp (small)
26110	Upper pole socket clamping bolt and nut
26111	Lower pole socket, complete
26112	Lower pole socket clamp
26113	Lower pole socket bolt and nut
26114	Lower pole socket body
26115	End yoke
3906	Nut for spring guide
26116	Buffer
26117	Pole socket axle pin
26118	Side rod, with nuts
26119	Side rod pin, with cotter
26098	Spring guide
26120	Compression spring
26121	Insulator section
26122	Brass washer for swivel pin

The U. S. 7 Base is for use with double trolley metallic return circuit. The distance between pole centers is 18 inches.

UNION STANDARD TROLLEY BASES

*No. 8 TROLLEY BASE

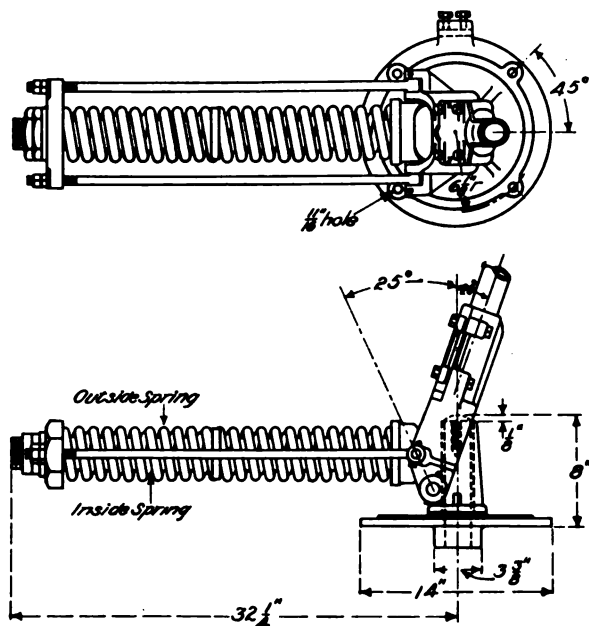
Approximate Weight, 173 lbs.



*The maximum length of pole to allow successful operation of this base is 18 feet. If longer pole is desired, the General Electric Company must decline the responsibility for the successful operation of the trolley. Poles 2 in. diameter at base.

By adjusting the compression spring the pressure on the trolley wire may be varied from 25 to 45 lbs. with a 15 ft. pole, Form 12 harp and Form 17 wheel at an angle of 45 degrees.

DIMENSIONS



Cat. No.	Description
26123	Trolley base, without pole
26124	Stand or foot, with terminal binding screw
26125	Swivel, with bushing
26126	Brass bushing for swivel
26127	Compression spring (large) (2 required)
26128	Compression spring (small), (2 required)
26129	Washer for springs
26130	Spring guide
3906	Nut for spring guide, (2 required)
26131	Side rod with nuts, (2 required)
26132	Side rod pin, with cotter, (2 required)
26133	Pole socket, complete
26134	Pole socket body
26135	Pole socket clamp
26136	Pole socket axle pin, with cotters
26137	Bolt and nut for pole socket, (4 required)
26138	End yoke
26139	Buffer yoke
26140	Stop pin for stand or foot
26141	Connecting clamp screw for stand or foot

The U.S. 8 base is designed for use only with extra long poles or when extra heavy upward pressure is required.

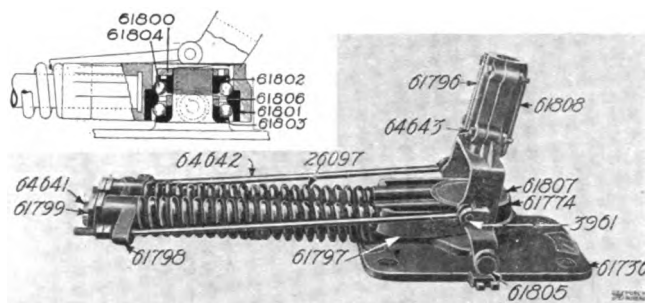
UNION STANDARD TROLLEY BASES

*No. 10 TROLLEY BASE—BALL BEARING

Approximate Weight, 200 lbs.

The U. S. 10 Base is designed to meet conditions requiring the minimum of height and at the same time extremely sensitive bearings: The pole socket is pivoted low so that the arch of the pole does not rise above the top of the base when the wheel is depressed to the car top. **The overall height is $4\frac{1}{2}$ inches.**

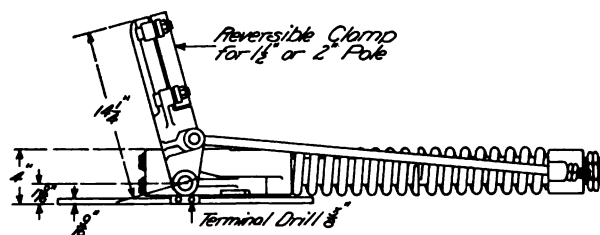
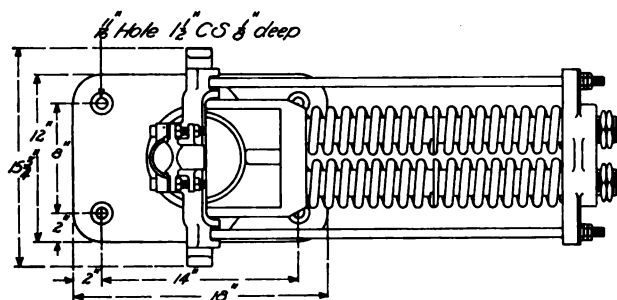
The base turns on ball bearings of substantial proportions and a cushioned stop has been provided to minimize the possibility of mechanical injury should the trolley wheel leave the wire. The bearing is the same as in the U. S. 14 Base.



U. S. No. 10 Ball Bearing Trolley Base

*The maximum length of pole to allow successful operation of the U. S. 10 Trolley Base is 18 feet. If a longer pole is used the General Electric Company will not guarantee the successful operation of the trolley. Reversible Pole Clamp accommodates $1\frac{1}{2}$ and 2 in. poles.

DIMENSIONS



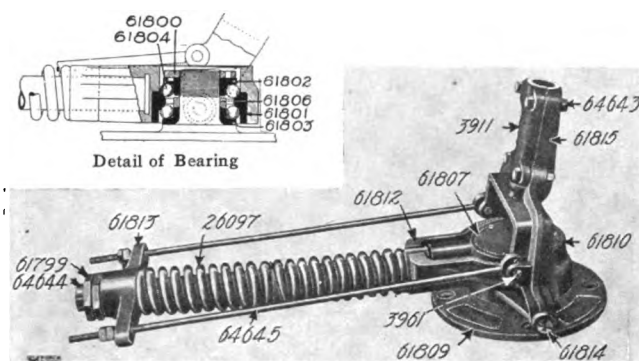
Cat. No.	Description
42628	U. S. No. 10 ball bearing trolley base, complete without pole
61736	Stand or Foot with terminal binding screws
61774	Swivel, including No. 61801
61776	Pole socket complete with clamp
61796	Pole socket clamp
61797	Buffer
61798	End yoke
61799	End nut, (4 required)
61800	Jam nut for ball race
61801	Outside ball race
61802	Upper inside ball race
61803	Lower inside ball race
61804	Steel ball, $\frac{3}{4}$ ", (32 required)
26097	Compression spring, (4 required)
64641	Spring guide, (2 required)
64642	Side rod with nuts, (2 required)
61805	Pole socket axle pin
3961	Side rod pin with cotter, (2 required)
64643	Bolt and nut for pole socket clamp, (4 required)
61806	Ball retainer
61807	Dust cover
61808	Pole socket body

UNION STANDARD TROLLEY BASES

*No. 11 TROLLEY BASE—BALL BEARING

Approximate Weight, 140 lbs.

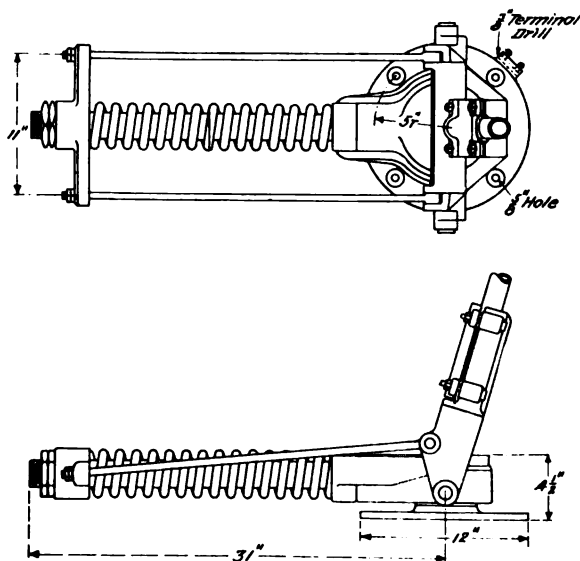
The U. S. 11 Base like the U. S. 10 has an overall height of $4\frac{1}{2}$ in. The pole socket is pivoted low so that the arch of the pole does not rise above the top of the base when the wheel is depressed to the car top. The base turns on ball bearings and is provided with a cushioned stop to minimize the possibility of mechanical injury should the trolley wheel leave the wire.



U. S. No. 11 Ball Bearing Trolley Base

*The maximum length of pole to allow successful operation of the U. S. 11 trolley base is 13 feet. If a longer pole is used the General Electric Company will not guarantee the successful operation of the trolley. Poles $1\frac{1}{2}$ in. diameter at base.

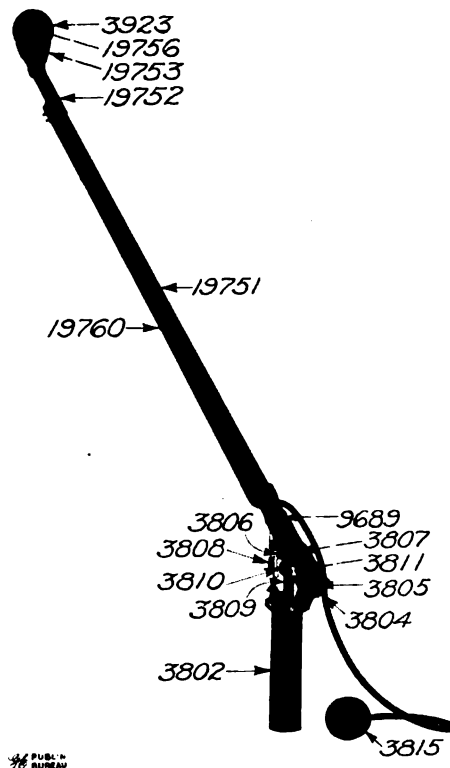
DIMENSIONS



Cat. No.	Description
42629	U. S. No. 11 ball bearing trolley base, complete without pole
61809	Stand or foot with terminal binding screws
61810	Swivel, including No. 61801
61811	Pole socket complete with clamp
3911	Pole socket clamp
61812	Buffer
61813	End yoke
61799	End nut, (2 required)
61800	Jam nut for ball race
61801	Outside ball race
61802	Upper inside ball race
61803	Lower inside ball race
61804	Steel ball, $\frac{3}{4}$ ", (32 required)
26097	Compression spring, (2 required)
64644	Spring guide
64645	Side rod with nuts, (2 required)
61814	Pole socket axle pin
3961	Side rod pin with cotter, (2 required)
64643	Bolt and nut for pole socket clamp, (4 required)
61806	Ball retainer
61807	Dust cover
61815	Pole socket body

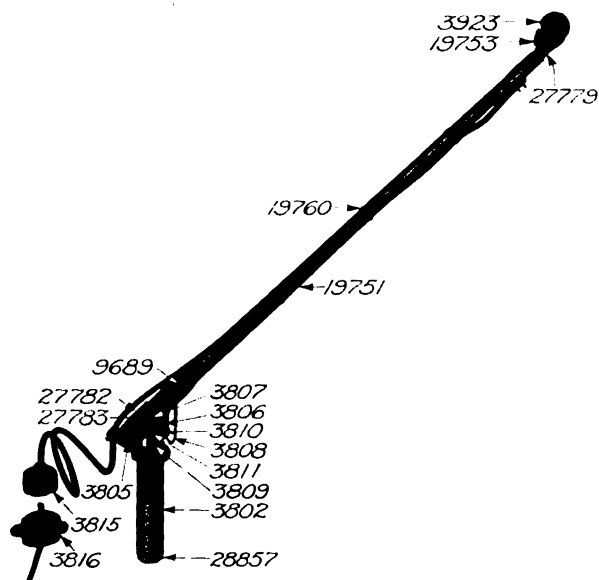
UNION STANDARD TROLLEY BASES

FORM D MINING TROLLEY



Cat. No.	Description	Cat. No.	Description
3800	Form D Mining Trolley, complete, with pole, harp, wheel, contact blocks and protection cap	3807	Pin for pole socket hook
19751	Wood pole, plain (specify length)	19757	Cotter for pole socket hook pin
19752	Pole head, with screws	3808	Chain, with rings
19753	Harp	3809	Plunger
19756	Wheel axle pin	3810	Cross head for plunger
19754	Harp swivel screw	3811	Cap screw for cross head
19755	Washer for swivel screw	3812	Stop nut for plunger
19757	Cotter for wheel axle pin	3813	Rubber buffer for stop nut
3923	Trolley wheel	3814	Compression spring
3801	Trolley base, complete	3815	Movable cable contact block, complete
3802	Trolley base	3816	Stationary controller cable contact block, complete
3803	Bottom nut for base	13687	Soft rubber bushing for No. 3816
3804	Pole socket	9887	Cap screw for No. 3816
3805	Pole socket axle pin	3817	Protection cap for No. 3816
16064	Cotter for socket axle pin	19760	Brass clips for cable
9689	Clamp screw for pole socket	3818	Bracket for cable
3806	Hook for pole socket	10430	Screw for bracket
		5250	Clamp screw for pole head

UNION STANDARD TROLLEY BASES FORMS D-4 AND D-5 MINING TROLLEYS

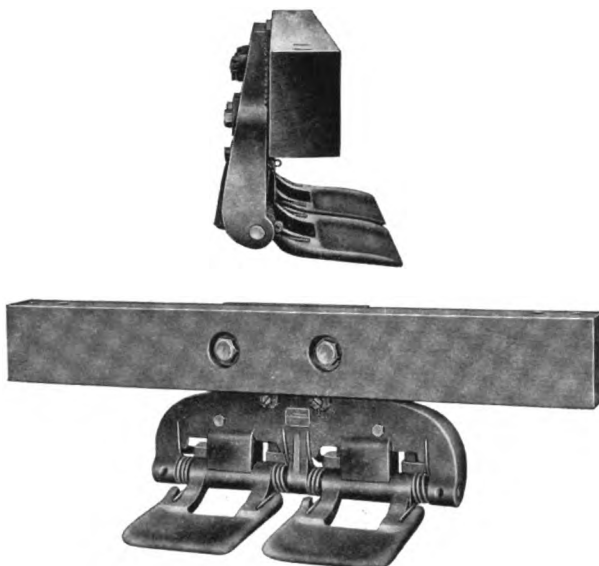


Cat. No.	Description
27778	Form D-4 Mining Trolley, complete, with pole, harp, wheel, contact blocks and protection cap
38597	Form D-5 Mining Trolley, complete, with pole, harp, wheel, contact blocks and protection cap
19751	Wood pole, plain, 6 feet (Other sizes, prices according to length.)
27779	Pole head with screws
19753	Harp, less axle pin
19756	Wheel axle pin
19754	Harp swivel screw
27780	Washer for swivel screw
19757	Cotter for wheel axle pin
3923	Trolley wheel
27781	Trolley base, complete, less pole and cables, for Form D-4 mining trolley
108464	Trolley base, complete, less pole and cables, for Form D-5 mining trolley
3802	Trolley base or cylinder, for Form D-4 mining trolley
38598	Trolley base or cylinder, for Form D-5 mining trolley
28857	Bottom nut for base
27782	Pole socket
3805	Pole socket axle pin
16064	Cotter for socket axle pin
9689	Clamp screw for pole socket
3806	Hook for pole socket
3807	Pin for pole socket hook
19757	Cotter for pole socket hook pin
3808	Chain with rings
3809	Plunger pipe
3810	Cross head for plunger
3812	Stop nut for plunger
3811	Cap screw for cross head
3813	Rubber buffer for stop nut
3814	Compression spring, for Form D-4 mining trolley
38599	Compression spring, for Form D-5 mining trolley
3815	Movable cable contact block, complete
3816	Stationary controller cable contact block, complete
13687	Soft rubber bushing for No. 3816
9887	Cap screw for No. 3816
3817	Protection cap for No. 3816
19760	Brass clips for cable
27783	Washer for pole hook pin
5250	Clamp screw for pole head

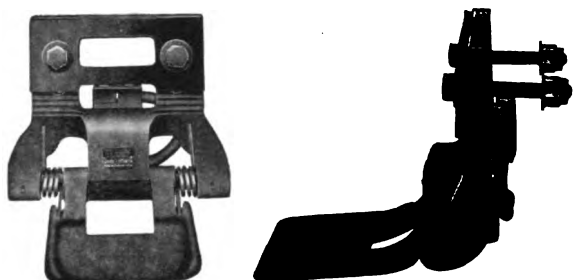
THIRD RAIL COLLECTORS



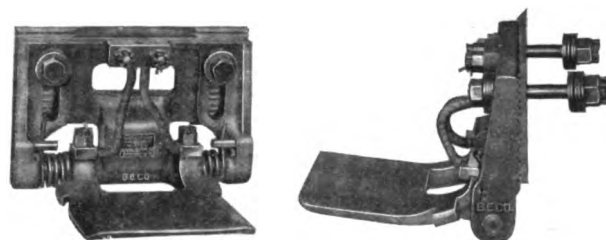
DN25-A Gravity Type Third Rail Collector



DN40-A Slipper Type Third Rail Collector



DN43-A Slipper Type Third Rail Collector



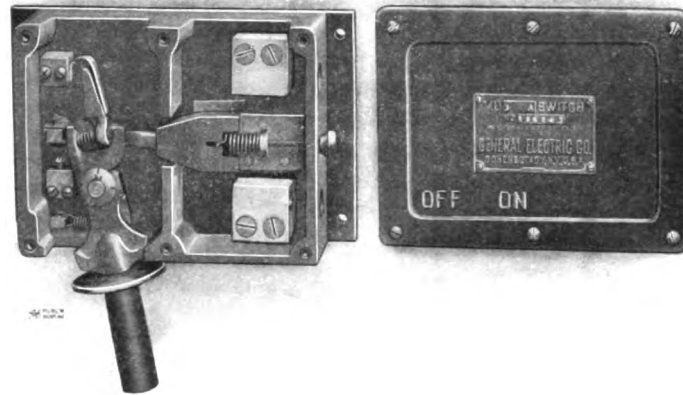
DN46-A and DN49-A Slipper Type Third Rail Collector

Cat. No.	Description	Design	Continuous Current Capacity	Contact Pressure in Lb.	Approx. Weight in Lb., Each
38585	DN25-A Gravity Type Collector	Over-running	800 amp.	15	70
38587	DN40-A Slipper Type Collector	Over-running	2000 amp.	35-45	142
38586	DN43-A Slipper Type Collector	Over-running	800 amp.	25-35	63
45414	DN46-A Slipper Type Collector	Under-running	800 amp.	25-35	76
111219	DN49-A Slipper Type Collector	Over-running	800 amp.	25-35	76

TYPE MU TRIPPING SWITCHES

The Type MU Tripping Switches are used only on Auxiliary Contactor Equipments.

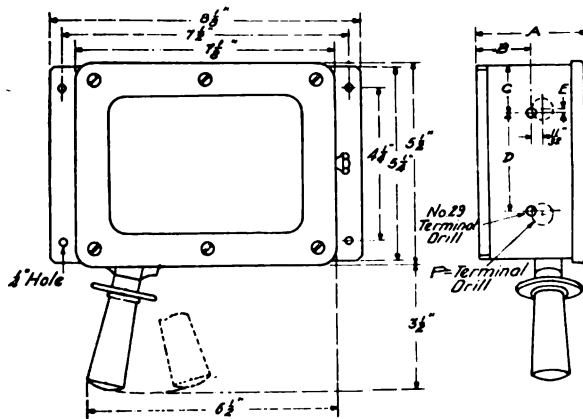
The switch box is constructed of a moulded compound which is unaffected by any service temperature. It is divided into two compartments. The front compartment contains the single-pole contact arm which is wired in series with the contactor pick-up coils, the tripping device, adjusting screw and operating handle. The back compartment contains a small blow-out coil for extinguishing the arc when the single-pole contact is opened, and the tripping, or series overload coil, which actuates the switch when excessive current flows through the power circuit.



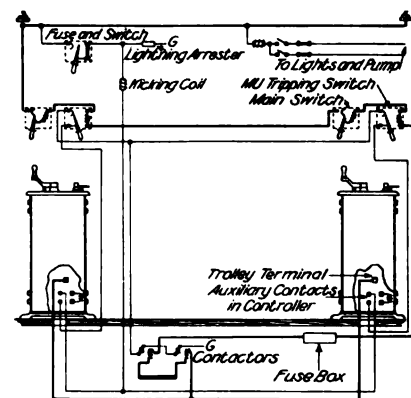
Types MU3, 4 and 5 Tripping Switches

As the current interrupted by the switch is only that required to energize the contactor coils the moving parts have little inertia, so that the circuit is broken as soon as the current in the tripping coil reaches a predetermined value which can be varied by the adjusting screw provided for that purpose. By moving the handle to the OFF position, the auxiliary circuit is opened, the contactors drop out and the power is completely cut off.

The magnetic blow-out and positive snap action of the switch insure arcs being definitely localized and quickly ruptured.



Dimensions of MU3, 4 and 5 Tripping Switches



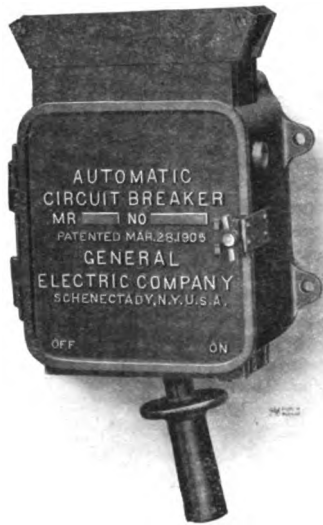
Wiring Diagram

Cat. No.	Description	AMPERES		
		Capacity of Switch	Continuous Capacity of Overload Coil	Tripping Points ^a
43334	MU3-A Tripping Switch	10	250	250-500- 750
43751	MU4-A Tripping Switch	10	100	100-200- 300
46764	MU5-A Tripping Switch	10	400	400-700-1000

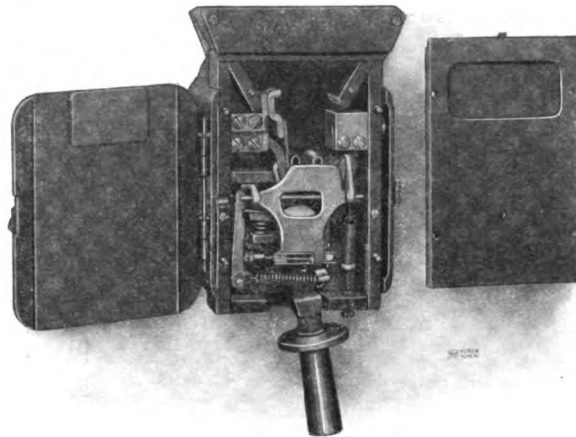
The ratings of the switch are given both for the single-pole contact and the series coil.

TYPE MR CIRCUIT BREAKERS

These circuit breakers are designed especially for electric railway cylinder controller equipments up to 400 h.p. capacity, and are used for two purposes, *viz.*, as a device to automatically break the main trolley circuit in case of excessive overloads or short circuits, and as a hand-operated main circuit switch. They are small, compact and thoroughly reliable, the operating mechanism being surrounded by a fibre lining enclosed in a non-magnetic box with a hinged iron cover, which prevents accidental contact with live parts.



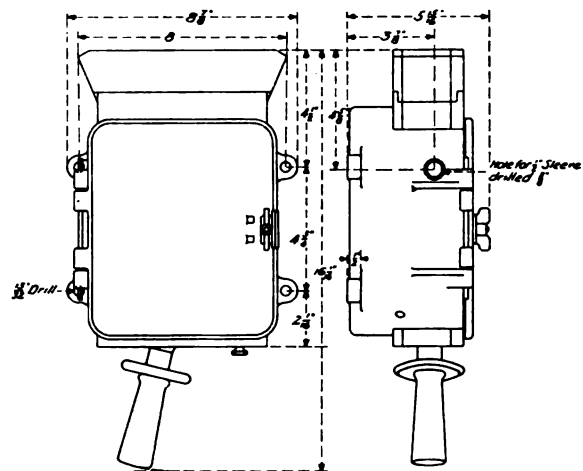
MR Circuit Breaker



Contact is made by arcing fingers together with a heavy brush, which in closing are brought face to face against the fixed contact. The brush is designed to carry nearly all the current and the fingers are so located with reference to the brush that while closing they make contact approximately $\frac{1}{4}$ in. ahead of the brush. They, therefore, thoroughly protect the brush by shunting and opening the circuit after the brush is well away from the contact block.

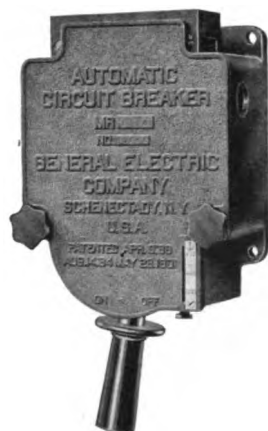
The complete working parts are encased in a fibre box chute, which in turn is encased in a non-magnetic metal box, having a cast-iron cover, which acts as part of the magnetic circuit for the blow-out and tripping mechanism. The cover is hinged to the box and held closed by a latch operated by a thumb nut. All parts of the breaker are, therefore, readily accessible for repair or inspection.

DIMENSIONS



Cat. No.	Type	Description	RATED CAPACITY		
			Minimum Calibration	Maximum Calibration	Maximum Voltage
61444	MR10-B	Front connected circuit breaker.	50 amp.	150 amp.	600
61446	MR11-B	Front connected circuit breaker.	100 amp.	300 amp.	600
61447	MR12-B	Front connected circuit breaker.	200 amp.	600 amp.	600
61448	MR13-B	Front connected circuit breaker.	300 amp.	900 amp.	600
61449	MR14-A	Front connected circuit breaker.	400 amp.	1200 amp.	600

TYPE MR CIRCUIT BREAKERS



Type MR Circuit Breaker

FRONT CONNECTED, 650 VOLTS

Cat. No.	Type	Continuous Ampere Capacity	CALIBRATION		Superseded by
			Min.	Max.	
23853	MR2-B	15	15	45	
*23854	MR3-C	50	50	150	MR-10
*23855	MR4-C	100	100	300	MR-11
*23856	MR5-C	200	200	600	MR-12

*Cat. Nos. 23854, 23855 and 23856 are listed only for convenience in ordering repair parts.

REPAIR PARTS

WOODEN BOXES

Cat. No.	Description
29303	Wooden box, complete, for Cat. Nos. 23854, 23855
29302	Wooden box, complete, for Cat. No. 23856

BLOW-OUT SPOOLS

32798	Blow-out spool, wound, complete, with connection block, for Cat. No. 23853	.	.	.	.
32799	Blow-out spool, wound, complete, with connection block, for Cat. No. 23854	.	.	.	.
32800	Blow-out spool, wound, complete, with connection block, for Cat. No. 23855	.	.	.	.
32801	Blow-out spool, wound, complete, with connection block, for Cat. No. 23856	.	.	.	.

CHUTES

32819	Fiber chute, complete, for Cat. No. 23853	.	.	.	.	.	.
32820	Fiber chute, complete, for Cat. Nos. 23854, 23855	.	.	.	.	.	.
32821	Fiber chute, complete, for Cat. No. 23856	.	.	.	.	.	.

CONTACT BASES

32839	Contact base, complete, with finger and spring, for Cat. No. 23853 (right-hand)	.	.	.	.
32840	Contact base, complete, with finger and spring, for Cat. Nos. 23854, 23855 (right-hand)	.	.	.	.
32841	Contact base, complete, with finger and spring, for Cat. No. 23856 (right-hand)	.	.	.	.
32842	Contact base, complete, with finger and spring, for Cat. No. 23853 (left-hand)	.	.	.	.
32843	Contact base, complete, with finger and spring, for Cat. Nos. 23854, 23855 (left-hand)	.	.	.	.
32844	Contact base, complete, with finger and spring, for Cat. No. 23856 (left-hand)	.	.	.	.
32853	Contact finger, complete, with spring and reinforcing strips, for Cat. No. 23853	.	.	.	.
32854	Double contact finger, complete, with spring and reinforcing strips, for Cat. Nos. 23854, 23855	.	.	.	.
32855	Double contact finger, complete, with spring and reinforcing strips, for Cat. No. 23856	.	.	.	.

ARCING TIPS

32858	Arcing tip, with stud and pin fastening Cat. Nos. 32839, 32842 in position	.	.	.	.
32859	Arcing tip, with stud fastening Cat. Nos. 32840, 32843 in position	.	.	.	.
32860	Arcing tip, with stud fastening Cat. Nos. 32841, 32844 in position	.	.	.	.

TYPE MR CIRCUIT BREAKERS**REPAIR PARTS****CONTACT SUPPORTS**

Cat. No.	Description
32870	Contact support, complete, with fiber joint and contact head, for Cat. No. 23853
32871	Contact support, complete, with fiber joint and contact head, for Cat. Nos. 23854, 23855
32872	Contact support, complete, with fiber joint and contact head, for Cat. No. 23856
32883	Contact segment, for Cat. No. 23853
32884	Contact segment, for Cat. Nos. 23854, 23855
32885	Contact segment, for Cat. No. 23856

MAIN AND TENSION SPRINGS

32896	Main spring, for Cat. No. 23853 (1½ turns, .102 in. Ph. Brz. Wire)
32897	Main spring, for Cat. Nos. 23854, 23855 (1½ turns, .144 in. Ph. Brz. Wire)
32898	Main spring, for Cat. No. 23856 (1½ turns, .182 in. Ph. Brz. Wire)
32899	Tension spring, for handle and contact support, for Cat. No. 23853 (11½ turns, .045 in. Ph. Brz. Wire) per 100
32900	Tension spring, for handle and contact support, for Cat. Nos. 23854, 23855 (11½ turns, .072 in. Ph. Brz. Wire)
32901	Tension spring, for handle and contact support, for Cat. No. 23856 (8½ turns, .072 in. Ph. Brz. Wire)

CATCH LEVERS

32902	Catch lever, complete, with spring and catch plate, for Cat. No. 23853
32903	Catch lever, complete, with spring and catch plate, for Cat. Nos. 23854, 23855
32904	Catch lever, complete, with spring and catch plate, for Cat. No. 23856

LOCKING LEVERS

32910	Locking lever, for Cat. No. 23853
32911	Locking lever, for Cat. Nos. 23854, 23855
32912	Locking lever, for Cat. No. 23856

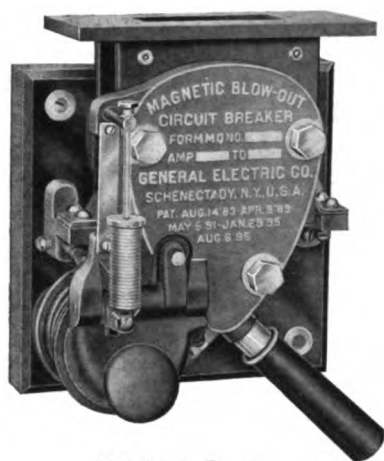
CALIBRATING SPRINGS

32933	Calibrating spring, with holder (16½ turns, .045 in. oxidized steel wire, ½ in. outside diam., closed), for Cat. No. 23853
32934	Calibrating spring, with holder (18½ turns, .050 in. oxidized steel wire, ½ in. outside diam., closed), for Cat. Nos. 23854, 23855
32935	Calibrating spring, with holder (16 turns, .089 in. oxidized steel wire, ¾ in. outside diam., closed), for Cat. No. 23856

CALIBRATING RODS

32936	Calibrating rod, with thumb nut, for Cat. No. 23853
32937	Calibrating rod, with thumb nut, for Cat. Nos. 23854, 23855
32938	Calibrating rod, with thumb nut, for Cat. No. 23856

TYPE MQ CIRCUIT BREAKERS



MQ Circuit Breaker

Cat. No.	Amp. Capacity	CALIBRATION		Style Handle	Superseded by
		Min.	Max.		
*14395	110	60	150	Fixed handle	MR-10
*14396	200	100	250	Fixed handle	MR-11
*14390	400	200	400	Fixed handle	MR-12

*Includes wooden cover not illustrated here.

These MQ circuit breakers are listed only for convenience in ordering repair parts.

REPAIR PARTS

Cat. No.	Description
3886	Arcing tip, with studs, for Nos. 14395, 14396
11067	Arcing tip, with studs, for No. 14390
11097	Blow-out spool, wound, complete, with connection block, for No. 14395
32778	Blow-out spool, wound, complete, with connection block, for No. 14396
32432	Blow-out spool, wound, complete, with connection block, for No. 14390
3881	Conducting strip, for Nos. 14395, 14396
11066	Conducting strip, for No. 14390
11098	Connection block, for Nos. 11097, 32778
32781	Connection block, for No. 32432
3872	Contact base, complete, with finger and conducting strip, for Nos. 14395, 14396 (left-hand)
3997	Contact base, complete, with finger and conducting strip, for No. 14390
11099	Contact base, complete, with finger and conducting strip, for Nos. 14395, 14396 (right-hand)
32782	Contact base, complete, with finger and conducting strip, for No. 14390 (right-hand)
3967	Contact segment, for Nos. 14395, 14396
11090	Contact segment, for No. 14390
32784	Calibrating spring, with holder (22 turns, .073" Steel Wire, oxidized finish) for Nos. 14395, 14396, 14390
3880	Double contact finger, complete, with spring and reinforcing strips, for Nos. 14395, 14396
11065	Double contact finger, complete, with spring and reinforcing strips, for No. 14390
3858	Fiber chute, complete, for Nos. 14395, 14396
3979	Fiber chute, complete, for No. 14390
3968	Fiber joint, for Nos. 14395, 14396
11092	Fiber joint, for No. 14390
3971	Handle, complete, with fulcrum, contact head and contact segment, for Nos. 14395, 14396
11078	Handle, complete, with fulcrum, contact head and contact segment, for No. 14390
11080	Handle, with stud and ferrule, for No. 14390
14516	Handle, with stud and polished ferrule, for Nos. 14395, 14396
3969	Spring for handle, for Nos. 14395, 14396 (2½ turns, .028" Ph. Brz. Wire)
11093	Spring for handle, for No. 14390 (2 turns, .181" Ph. Brz. Wire)

TYPE ML-2 CIRCUIT BREAKER



ML-2 Circuit Breaker

This circuit breaker is listed only for convenience in ordering repair parts. The breaker complete includes wooden cover not shown in illustration.

CAT. NO.	Ampere Capacity	CALIBRATION		Style of Handle	Superseded by
		Min.	Max.		
23207	500	100	800	Locking	MR-13

REPAIR PARTS

Cat. No.	Description
32688	Blow-out spool, complete, with stud, insulation sleeve and cap
13978	Core with stud, for blow-out spool and pole pieces, for Cat. No. 23207
32695	Blow-out chute, complete
32700	Support for secondary contact (right-hand)
32701	Support for secondary contact (left-hand)
32703	Double contact finger, with spring and reinforcing strips, for secondary contact (right-hand)
32704	Double contact finger, with spring and reinforcing strips, for secondary contact (left-hand)
32706	Copper connection strip, for Cat. No. 32703
32707	Copper connection strip, for Cat. No. 32704
32708	Arcing tip
32709	Insulating joint, complete, with contact segment
13987	Main contact stud, for Cat. No. 23207
13999	Laminated contact brush, for Cat. No. 23207
14236	Spring for brush-holder (4 turns, .156 in. Ph. Brz. Wire, closed)
32722	Locking handle, with stud and ferrule, for Cat. No. 23207
14256	Calibrating spring with holder (22 turns, .073 in. Steel Wire, closed)

LIGHTNING ARRESTERS—DIRECT CURRENT

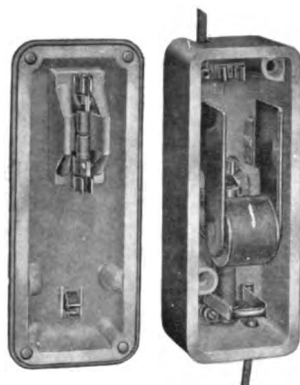
TYPE M FORM D-2

The Type M Form D arrester has been our standard for direct current circuits for several years past, and is furnished for railway and power circuits of from 250 to 1800 volts.

The spark gap and non-inductive resistance of this arrester are in a straight line, thus forming a direct path for the discharge and reducing to a minimum the possibility of short circuit in the box, due to excessively heavy lightning discharges. One of the valuable features of the MD-2 arrester is the



Type M Form D-2 Arrester



Type M Form D-2 Lightning Arrester
(Showing Interior)

fact that all parts can be readily inspected on removing the cover of the porcelain enclosing box, and one can see at a glance if the arrester is in proper condition for the next storm. The box and cover are made of brown glazed porcelain, and the cover is arched in form, giving it great strength. The gap is surrounded by a strong electro-magnet which immediately blows the dynamic arc out through the chute after the lightning discharge has passed.

The gaps on arresters up to 850 volts are adjusted to .025 in. and the gaps on the arresters from 600 to 1800 volts are adjusted to .094 in. These arrangements have been found to afford excellent protection to the insulation of the equipments, due to the low breakdown points. The spark gap terminals are threaded and attached to the lid of the box, thus affording a ready method of adjustment, positive grip on the terminals, and easy access for examination.

POLE INSTALLATION

For pole installation the number of arresters required will vary according to the severity and frequency of lightning disturbances. It is recommended, however, that not less than four arresters per mile be installed.

FOR 250 TO 850 VOLTS

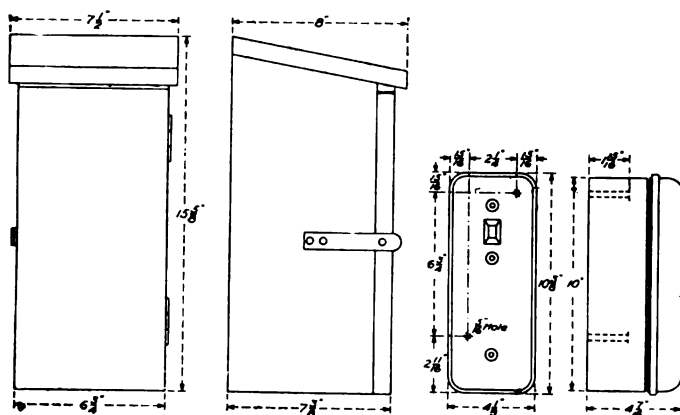
Cat. No.	Description
33623	For station use
33625	In wooden box for line use
33869	Extra resistance

FOR 600 TO 1800 VOLTS

*78508	For station use
78609	In wooden box for line use
59925	Extra resistance

*Consists of two arresters which should be installed in series.

DIMENSIONS



TYPE MA FUSE BOXES

The Type MA Fuse Boxes are designed for use in trolley circuits and the various forms fulfill the requirements of every standard railway equipment. As an automatic protective device for railway equipments, this type of fuse box is strong and reliable.

METHOD OF SECURING FUSE

The copper ribbon fuse is clamped at the ends by wedge-shaped blocks, which are drawn into place with hand screws, thereby exerting a powerful pressure on the fuse and insuring excellent contact. A few turns of the hand screws, the grips of which are made large for ease in manipulation, are sufficient to free the fuse or bind it in place.



MAGNETIC BLOW-OUT

A simple and valuable feature of this type of fuse box is the peculiar form of the magnetic blow-out employed. Unlike the ordinary method of obtaining a magnetic field, no coil is used, the flux set up about the fuse as a conductor alone producing it. (The MA14-H for 1200 volt service on account of this high potential has blow-out coils.) The blow-out is obtained by a special arrangement of soft iron plates or poles built in the cover and the back of the box, which, being brought together at the hinges, distribute the magnetic lines to the best advantage.

METHOD OF SUSPENSION

Type MA-12, Forms A & B have back extended at each end and drilled to accommodate 1 in. bolts.

Type MA-13, Form A has two malleable iron feet, drilled for $\frac{1}{2}$ in. bolts or lag screws. The feet can be readily removed if desired, and the holes used for holding them to the box can be utilized for attaching the box to the car.

Type MA-14, Form E has wrought iron feet, drilled to take $\frac{1}{2}$ in. lag screws or bolts.

Type MA-14, Form F has no iron feet, but is provided with a wooden beam for attaching the box to a third rail shoe beam.

Type MA-14, Form G has the back extended at each end and is provided with $\frac{3}{8}$ in. square holes for carriage bolts.

Type MA-14, Form H has no feet, these being replaced by a small beam for fastening the box to a third rail collector beam.

Cat. No.	Type	Amps.	Volts
35304	MA12-A	1600	600
38669	MA12-B	1600	600
35305	MA13-A	500	600
66048	MA14-E	1000	600
66049	MA14-F	1000	600
66050	MA14-G	1000	600
66051	MA14-H	500	1200

COPPER RIBBON FUSES FOR TYPE MA FUSE BOXES

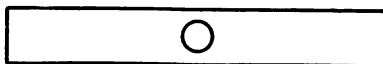


Fig. 1

CONTINUOUS CARRYING CAPACITY

The continuous carrying capacity of the fuse is approximately midway between the rating and the 3-minute fusing current.

FUNCTION OF HOLE AT CENTER OF FUSES

The hole in the fuse (see Fig. 1) which is located at the center of the copper ribbon is for the double purpose of localizing the heating and for causing the arc to rupture at the center of the magnetic field. This insures positive arc rupture, minimum fusing of ribbon, and prevents burning of terminals.

Fuse Box Type	Cat. No. of Fuse	Ampere Rating	FUSING CURRENT BLOWS IN	
			3 Min.	$\frac{1}{2}$ Min.
* MA-5 -10 & -11	24983	500	650	690
	28620	350	480	500
	38665	400	545	570
	28621	500	650	690
	28750	600	765	820
	38666	700	930	1025
	28751	800	1030	1180
	38667	900	1130	1425
	58040	1000	1333	1850
	38668	1200	1575	1850
MA-12	34329	1600	2000	2625
	42504	125	175	200
	38663	150	205	225
	29428	175	235	255
MA-13	29429	200	265	290
	38664	250	325	350
	29430	300	410	470
	41248	350	475	560
	44306	400	515	620
MA-14	58225	500	667	
	49402	350	467	
	49403	400	533	
	49404	500	667	
	49405	600	800	
	49406	700	933	
	49407	800	1066	
	49408	900	1200	
†	62560	150	200	

A fuse is rated at 25 per cent. less than the current required to blow it in three minutes.

*For fuse block Cat. No. 39423 (Manhattan Railway) wedge clip type.

†For MA-14D only.

HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS

Type MS Hood Switches are used principally on railway equipments. They can, however, be used on any circuits of not over 600 volts, and the *rated* current capacity of each individual switch.

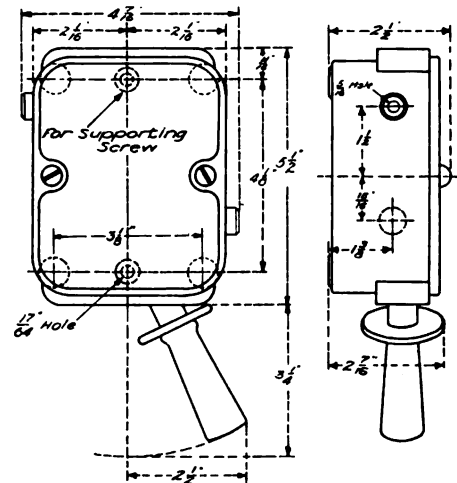
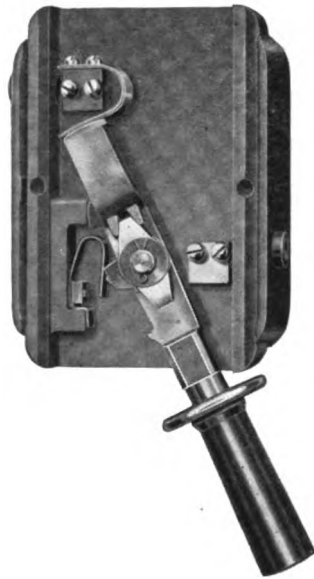
The switches are placed in the vestibule of the car within easy reach of the motorman and are closed by throwing handle to the right and opened by throwing handle to the left. The arc is definitely localized and quickly ruptured by the *magnetic blow-out and snap action of the switches.

Type MS Switches are small, compact and thoroughly reliable under all conditions of service. All parts are readily accessible for repair and inspection.

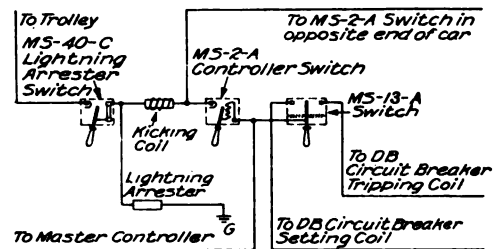
The switch consists of a neat, substantial metal box enclosing a moulded compound case or chute to which the lever carrying the handle and contact is pivoted. All live parts are thoroughly protected and the moulded compound used in the chute is not affected by any service temperature.

TYPE MS2-A

15 AMPERES, 600 VOLTS



Dimensions of MS2-A Hood Switch



Connections of MS2-A as a Master Control Switch on Type M Equipments

This switch is the standard master control switch for Type M control equipments.

It is closed by throwing the handle to the right, and in closing the contact at the upper end of the handle, the lever makes a positive wiping contact with a heavy copper spring mounted on the upper left-hand terminal. This *upper left-hand* terminal is the *positive side* of the switch. The trigger spring located at the lower left-hand corner of the chute and resting against the shoulder on the handle lever insures the switch's remaining in its last thrown position and gives a positive snap action in opening.

When used as a master control switch, the MS2-A Switch is wired in series with the MS40-C Lightning Arrester Switch.

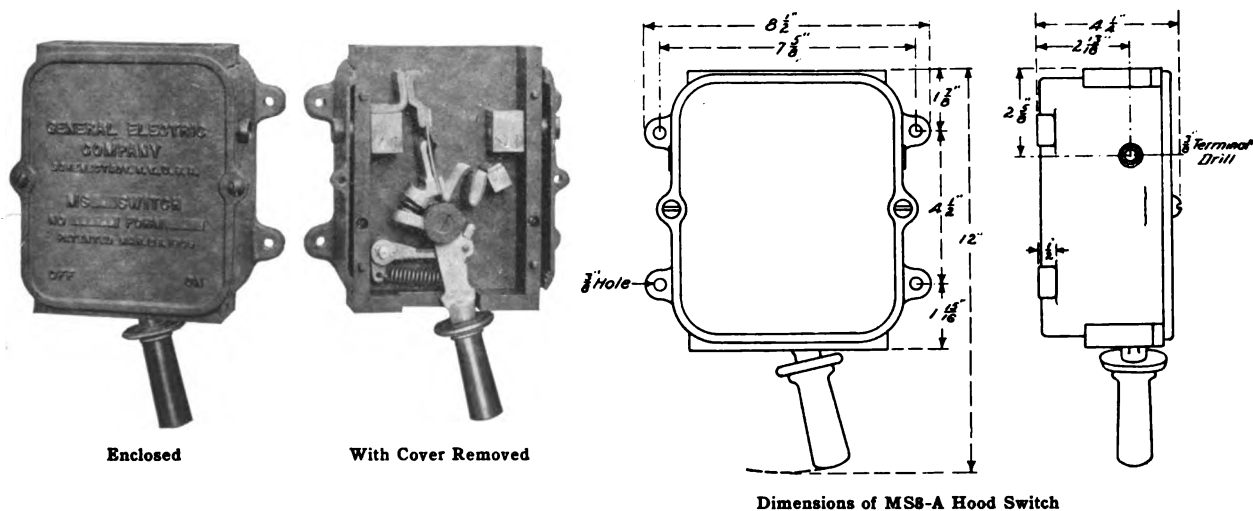
* The MS40-C has no magnetic blow-out.

HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS2-A

Cat. No.	Description
30421	MS2-A Hood Switch, complete
49357	BOX CASTING
49397	Cover for box casting, with arc chute cover
49398	Arc chute cover with rivets
48312	Screw fastening cover to box casting and arc chute in position (14-24, 1 $\frac{3}{4}$ " R.H. Blued)
49375	Bushing for leads for box casting
49399	ARC CHUTE body
49377	Terminal block, upper, with contact spring
49401	Terminal block, lower
49378	Contact spring for No. 49377
23261	Binding screw for Nos. 49377, 49401 and screw fastening contact spring in position (8-32, $\frac{1}{4}$ " R.H. Blued)
1657	Screw fastening Nos. 49377, 49401 to arc chute (8-32, $\frac{3}{8}$ " F.H.)
49379	Handle lever, with copper contact
49380	Copper contact with rivets
49381	Handle with stud, collar and guard
49382	Handle guard
49383	Collar for handle
49400	BLOW-OUT COIL, complete
49385	Pole piece, with fulcrum pin for handle lever
49386	Spring washer for handle lever
49387	Washer for fulcrum pin ($\frac{11}{32}$ " x $\frac{1}{4}$ " x .034")
10110	Spring cotter for fulcrum pin ($\frac{5}{16}$ " x $\frac{1}{2}$ ")
49388	Screw fastening pole piece in position (14-24, $\frac{3}{4}$ " F.H. Brass)
49389	Insulation bushing for No. 49388
49390	Spring for handle lever
49391	Stop plate for handle lever
49392	Screw fastening Nos. 49390, 49391 to arc chute (6-32, $\frac{1}{4}$ " R.H.)
49393	Nut for No. 49392 (6-32, Sq. Brass)
35829	Washer for No. 49392 ($\frac{5}{32}$ " x $\frac{5}{16}$ " x .030" Brass)

TYPE MS8-A, 200 AMPERES, 600 VOLTS



The Main Circuit Switch MS8-A is suitable for equipments not exceeding 200 horse-power.

HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS8-A

The switch is of the quick break type, and has split fingers supported by springs in such a manner that in closing, a wiping motion is imparted to them, tending to clean the contact surfaces and to always insure good electrical connection. The switch is exceptionally simple in design and in operation. The main moving parts consist of an upper and a lower member mounted upon a stud which acts both as a pivot for these parts and as a magnetic core for the blow-out spool.

The magnetic blow-out, together with the quick break action, and a wide gap at the contacts, insures reliability under all conditions of service.

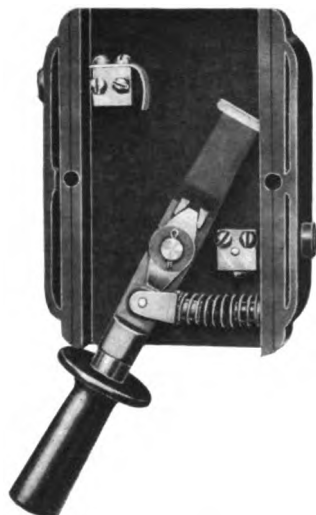
A fibre box, or chute, surrounds the working parts of the switch, and acts as an effectual insulation between live parts and the outside metal casing.

Cat. No.	Description
36881	MS8-A Hood Switch, complete
58666	Cover for box casting
49412	Screw fastening cover to box casting ($\frac{1}{8}$ "-18, $\frac{3}{8}$ " R.H. Blued)
58667	Bushing for leads for box casting
58668	ARC CHUTE, complete
58669	Front plate
58670	Back plate
58671	Side plate with pins, right-hand
58672	Side plate with pins, left-hand
58673	Bottom plate
44077	Screw fastening bottom plate to back and side plates (10-32, $\frac{1}{4}$ " F.H.)
49419	Screw fastening arc chute to box casting (14-24, $2\frac{1}{4}$ " Fill. H.)
58674	Terminal block, right-hand, with stud and bushing
58675	Terminal block, left-hand, with contact tip and bushing
58676	Contact tip, for No. 58675
22345	Screw fastening No. 58676 to block (14-24, $\frac{1}{4}$ " F.H. Brass)
58677	Bushing for terminal blocks
32895	Binding screw for terminal blocks and screw fastening No. 58675 in position (14-24, $\frac{1}{4}$ " F.H. Blued)
2028	Screw fastening No. 58674 in position (14-24, $\frac{1}{4}$ " F.H.)
58680	Terminal post
58678	Nut for terminal block stud and terminal post ($\frac{1}{4}$ "-13, $\frac{1}{8}$ " thick, Hex. Brass Cham. both sides)
58679	Lock Washer for No. 58678 ($\frac{1}{4}$ " x $1\frac{1}{2}$ " x .10" Ph. Brz.)
58681	Nut for terminal post ($\frac{1}{4}$ "-13, Hex. Brass Cham. one side)
58682	Contact lever with catch plate
58683	Catch plate
58684	Screw fastening No. 58683 to lever (6-32, $\frac{1}{4}$ " F.H. Blued)
58685	CONTACT FINGERS, complete, with springs and laminated connections
58686	Contact finger, with rivets
58687	Laminated connections with washers and rivets
58688	Screw fastening springs and connections to contact lever and terminal post (10-32, $\frac{1}{4}$ " F.H. Blued)
58689	Double washer plate for No. 58688
58690	Handle lever
58691	Handle with stud and guard
58692	Handle guard
58693	Blow-out coil core and fulcrum for contact and handle levers
58694	Lock washer for No. 58693 ($\frac{1}{4}$ " x $1\frac{1}{2}$ " x .10" Ph. Brz.)
58695	Retaining washer for handle lever ($\frac{1}{8}$ " x $1\frac{1}{2}$ " x $\frac{3}{16}$ " thick, countersunk hole)
42595	Screw fastening No. 58695 to blow-out coil core ($\frac{1}{8}$ "-18, $\frac{3}{8}$ " F.H. Blued)
58696	Compression spring for contact and handle levers ($3\frac{1}{2}$ turns, .091" Ph. Brz. wire)
58697	Catch lever with catch plate
58698	Catch plate with rivets
58699	Hinge pin for catch lever
9997	Large washer for No. 58699 ($\frac{1}{4}$ " x $\frac{3}{4}$ " x .060" Brass)
48135	Small washer for No. 58699 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060" Brass)
3884	Nut for No. 58699 ($\frac{1}{8}$ "-18, $\frac{1}{4}$ " thick, Hex. Brass Cham. both sides)
4030	Spring cotter for No. 58699 ($\frac{3}{32}$ " x $\frac{1}{8}$ ")
58700	Tension spring for contact and catch levers
58701	BLOW-OUT COIL
58702	Bushing for blow-out coil core
58703	Fiber sleeve for bushing ($\frac{3}{8}$ " x $1\frac{1}{2}$ " x $\frac{1}{4}$ " long)
58704	Pole piece
58705	Washer between pole piece and blow-out coil ($1\frac{1}{8}$ " x $3\frac{1}{2}$ " x .010" mica)
51726	Screw fastening pole piece to blow-out coil core ($\frac{1}{8}$ "-18, $\frac{3}{8}$ " F.H.)
56743	Screw fastening pole piece to arc chute (14-24, $\frac{1}{4}$ " F.H.)
58706	Insulation between blow-out coil and arc chute

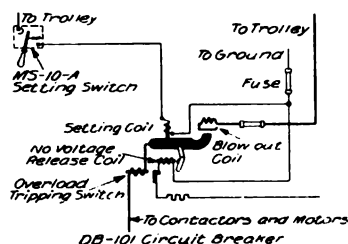
HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS10-A

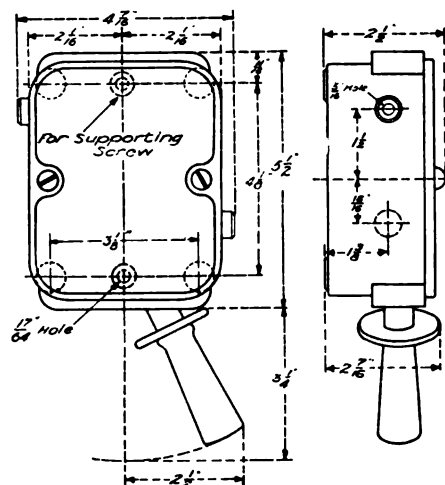
MAGNETIC BLOW-OUT



With Cover Removed



Connections of MS10-A as a Setting Switch for the DB-101 Circuit Breaker



Dimensions of MS10-A Hood Switch

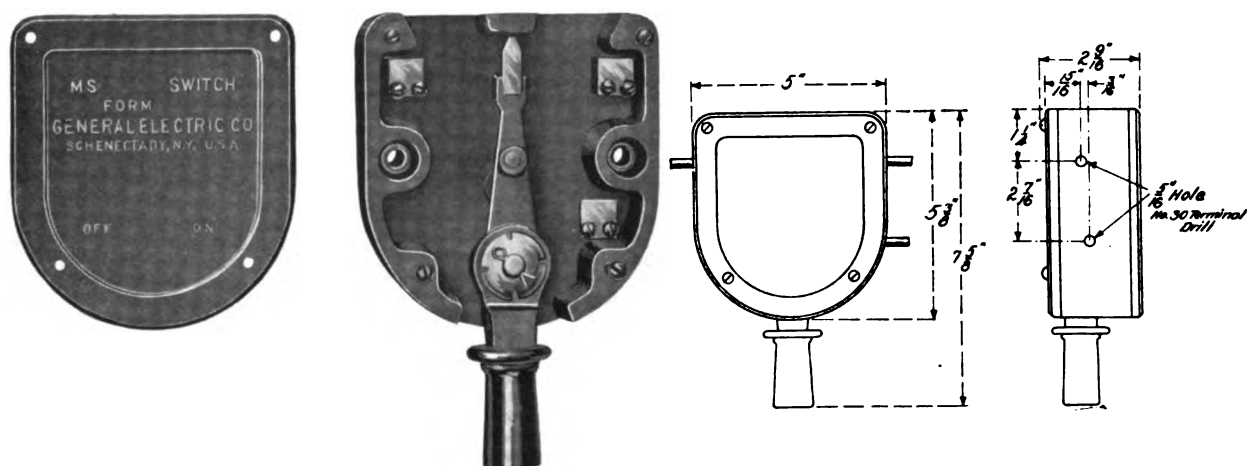
The MS10-A Switch is the standard setting switch for the DB-101 circuit breaker.

The switch is closed by throwing the handle to the right and, in closing the contact at the upper end of the handle, the lever makes contact with the heavy copper spring mounted on the upper left-hand terminal. Upon releasing the handle, the switch is returned to its off position by the action of the spring at the lower end of handle lever. The *upper left-hand terminal is the positive side of the switch.*

Cat. No.	Description
30424	MS10-A Hood Switch, complete
49357	BOX CASTING
49397	Cover for box casting, with arc chute cover
49398	Arc chute cover with rivets
48312	Screw fastening cover to box casting and arc chute in position (14-24, 1 1/4" R.H. Blued)
49375	Bushing for leads for box casting
49396	ARC CHUTE BODY
49427	Terminal block, upper, with contact spring
49401	Terminal block, lower
58707	Contact spring for No. 49427
23261	Binding screw for Nos. 49427, 49401 and screw fastening contact spring in position (8-32, 1/4" R.H. Blued)
1657	Screw fastening Nos. 49427, 49401 to arc chute (8-32, 3/8" F.H.)
58708	Handle lever with copper contact and spring clevis
58709	Copper contact with rivets
58710	Spring clevis with pin
49381	Handle with stud, guard and collar
49382	Handle guard
49383	Collar for handle
58711	BLOW-OUT COIL, complete
49385	Pole piece with fulcrum pin for handle lever
49386	Spring washer for handle lever
49387	Washer for fulcrum pin (1 1/8" x 1/4" x .034")
10110	Spring cotter for fulcrum pin (3/16" x 1/4")
49388	Screw fastening pole piece in position (14-24, 3/4" F.H. Brass)
49389	Insulation bushing for No. 49388
58712	Spring for handle lever (10 turns, .064" steel wire oxidized)
58713	Fiber button for spring

HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS13-A



The MS13-A is the standard setting and tripping switch for Type DB circuit breakers used on Type M control equipments. The switch consists of a neat, substantial compound-insulated box to which the contact lever is pivoted.

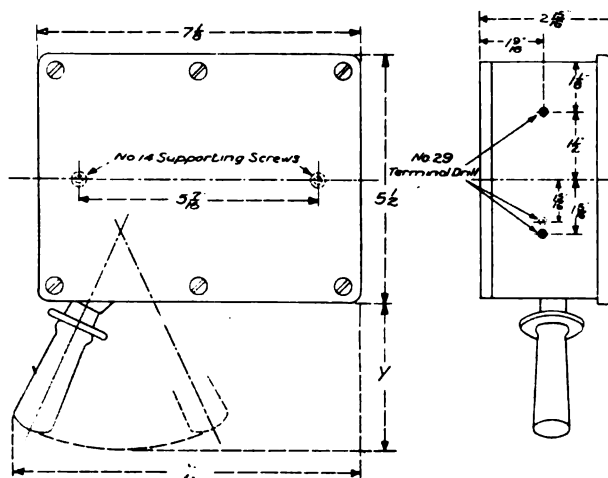
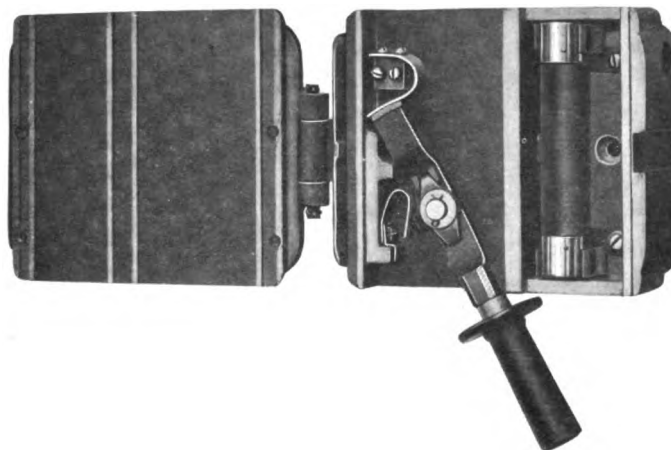
The switch is normally held in its central position by a strong spring; the words "On" and "Off" stamped on the cover indicate the direction in which the handle should be thrown to set or trip the DB circuit breaker.

The magnetic blow-out insures the arc's being definitely localized and quickly ruptured.

Cat. No.	Description
68160	Type MS13, Form A Magnetic Blow-Out Switch, complete
100432	SWITCH BOX, with pin for handle lever spring
100433	Pin for handle lever spring
100434	Washer for No. 100433 ($\frac{1}{16}$ " x $\frac{1}{4}$ " x .034")
100435	Front cover for switch box
100436	Back cover for switch box
26870	Screw fastening No. 100435 to box (10-24, $\frac{1}{4}$ " R.H. Blued)
4011	Screw fastening No. 100436 to box (No. 6, $\frac{1}{4}$ " F.H.)
100437	Terminal block, upper
100438	Terminal block with connection pin, lower
14434	Binding screw for terminal blocks (8-32, $\frac{1}{4}$ " R.H. Blued)
1193	Screw fastening terminal blocks to switch box (8-32, $\frac{1}{4}$ " F.H.)
100439	Handle lever with handle, stud, guard and contact
100440	Handle
100441	Handle guard
100442	Copper contact with rivets
100443	Bearing post for handle lever
17352	Nut for bearing post ($\frac{1}{4}$ "-16, $\frac{1}{4}$ " thick, $\frac{11}{16}$ " across flats Hex. Brass Cham. both sides)
58783	Washer for bearing post ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .034")
49386	Spring washer for bearing post
100505	Spring cotter for bearing post ($\frac{1}{16}$ " x $\frac{1}{4}$ " copper plated)
100444	Spring for handle lever (2 turns, .063" black spring steel wire)
100445	Pole piece with blow-out coil cores
100446	Washer for blow-out coil cores ($\frac{1}{4}$ " x $1\frac{1}{4}$ " x .034")
58762	Blow-out coil
100447	Copper terminal for blow-out coil
100448	Insulation for blow-out coil
49388	Screw fastening pole piece in position (14-24, $\frac{1}{4}$ " F.H. Brass)
100449	Bushing for No. 49388 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x $\frac{1}{16}$ " long fiber)

HOOD SWITCHES FOR RAILWAY SERVICE

TYPE MS40, FORMS A, C AND F



Dimensions of MS40, Forms A, C and F Switches

FORMS A AND F

The MS40-A and F Switches and fuse cut-outs are standard for air compressors and Type M control equipments.

The switch is closed by throwing handle to the right and, in closing the contact at upper end of the handle, lever makes a positive wiping contact with a heavy copper spring mounted on the upper left-hand terminal. This *upper left-hand terminal is the positive side of the switch*. The trigger spring, located at the lower left-hand corner of the chute and resting against the shoulder on the handle lever, insures the switch's remaining in its last thrown position.

FORM C

The construction of the MS40-C is essentially the same as the MS40-A with the exception that it has no *blow-out coil* and *will not open a live circuit*.

The MS40-C is used as a lightning arrester switch on Type M and Auxiliary Contactor Equipments. The current is taken from the trolley through this switch and fuse, then through a small

HOOD SWITCHES FOR RAILWAY SERVICE

choke or kicking coil to a MS2-A or a Type MU switch, thence to the control circuit. The fuse protects both the control circuit and the switch.

If the lightning arrester becomes damaged, the fuse blows and the car is inoperative until the lightning arrester has been repaired or cut out of service.

TYPE MS40, FORMS A, C AND F COMBINED SWITCH AND FUSE CUT-OUT

Cat. No.	Description
30400	MS40-A Hood Switch, complete
29633	MS40-C Hood Switch, complete
108465	MS40-F Hood Switch, complete
49370	Spring catch, with tip and rivets
49371	Cover for box casting with arc chute cover and releasing button for spring catch
49372	Arc chute cover with rivets
49373	Releasing button with pin
49374	Hinge pin for cover ($\frac{1}{4}$ " x $2\frac{3}{8}$ ")
3839	Spring cotter for No. 49374 ($\frac{3}{16}$ " x $\frac{3}{8}$ ")
49375	Bushing for leads for box casting
49376	ARC CHUTE BODY
25726	Long screw fastening No. 49376 to box casting (10-24, $1\frac{1}{2}$ " F.H. Brass)
1397	Short screw fastening No. 49376 to box casting (10-24, $\frac{3}{4}$ " F.H. Brass)
49377	Terminal block, with contact spring
49378	Contact spring
23261	Binding screw for terminal block and screw fastening contact spring to block (8-32, $\frac{1}{4}$ " R.H. Blued)
1657	Screw fastening No. 49377 to arc chute (8-32, $\frac{3}{8}$ " F.H.)
49379	Handle lever with copper contact
49380	Copper contact with rivets
49381	Handle with stud, collar and guard
49382	Handle guard
49383	Collar for handle
49384	BLOW-OUT COIL, complete, for the MS40-A Switch only
111220	Blow-out coil, complete for the MS40-F Switch only
49385	Pole piece with fulcrum pin for handle lever
49386	Spring washer for handle lever
49387	Washer for fulcrum pin ($\frac{3}{16}$ " x $\frac{3}{4}$ " x .034")
10110	Spring cotter for fulcrum pin ($\frac{3}{16}$ " x $\frac{3}{4}$ ")
49388	Screw fastening pole piece in position (14-24, $\frac{3}{4}$ " F.H. Brass)
49389	Insulation bushing for No. 49388
49390	Spring for handle lever
49391	Stop plate for handle lever
49392	Screw fastening Nos. 49390, 49391 to arc chute (6-32, $\frac{1}{2}$ " R.H.)
49393	Nut for No. 49392 (6-32, Sq. Brass)
35829	Washer for No. 49392 ($\frac{3}{16}$ " x $\frac{1}{16}$ " x .030" Brass)
49394	Fuse clip with terminal plate, upper
49395	Fuse clip with terminal plate, lower
25	Screw fastening fuse clips in position (10-32, $\frac{1}{16}$ " F.H.)
10195	Connection screw for fuse clips (10-32, $\frac{1}{16}$ " R.H. Brass)
33795	Washer for No. 10195 ($\frac{1}{16}$ " x $\frac{1}{16}$ " x .040" Brass)
.....	Copper connection wire for the MS40-C Switch only ($7\frac{1}{2}$ " long, No. 10 B.&S. D.C.C.)

The cut-outs accommodate fuses of the following capacities:

Type of Switch	Continuous Capacity of Switch	Cat. No. of Fuse	Capacity of Fuse—Amperes
MS40-A and C	15 amp.	42398	5
		29177	10
		37800	15
		37801	20
MS40-F	35 amp.	37802	30
		37803	40

CONTROLLER CONTACT FINGERS

TYPE B CONTROLLERS

Controller	SINGLE FINGERS									SETS OF FINGERS		
	Operating			Reversing			Brake			Cat. No.		
	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Operating	Reversing	Brake
B- 3A	36773	6	53	37900	8	29	37900	7	29	38023	38018	38019
	37902	9	41									
B- 3B	36773	6	53	37900	8	29	37900	7	29	38023	38018	38019
	37902	9	41									
B- 3G	36773	6	53	37900	8	29	37900	7	29	38023	38018	38019
	37902	9	41									
B- 4A	37904	5	56	37905	8	30	37905	7	30	38024	38021	38022
	37906	9	42									
B- 5A	37904	6	56	37905	8	30	37905	7	30	38025	38021	38022
	37906	9	42									
B- 6A	37904	6	56	37905	16	30	37905	14	30	38025	38026	38027
	37906	9	42									
B- 8A	37904	15	56	37905	16	30	37904	10	56	38028	38026	38032
	37906	1	42				37906	2	42			
							37905	24	30			
B- 8B	37904	15	56	37905	16	30	37904	10	56	38028	38026	38032
	37906	1	42				37906	2	42			
							37905	24	30			
B- 8C	37904	15	56	37905	16	30	37904	10	56	38028	38026	38032
	37906	1	42				37906	2	42			
							37905	24	30			
B-13A	37911	5	48	37900	8	29	* 37900	16	29	38038	38018	* 38039
	37912	11	43									
B-13B	37911	5	48	37900	8	29	* 37900	16	29	38038	38018	* 38039
	37912	11	43									
B-13C	37911	5	48	37900	8	29	* 37900	16	29	38038	38018	* 38039
	37912	11	43									
B-18A	37902	8	41	37900	8	29	37900	7	29	38045	38018	38019
	36773	6	53									
B-19A	34401	15	44	37905	16	30	37905	24	30	38046	38026	38047
	51492	4	14				37917	1	49			
							37918	9	44			
B-23A	37913	5	49	37905	8	30	* 37905	16	30	38041	38021	* 38026
	34401	11	44									
B-24A	37911	5	48	37900	8	29	* 37900	16	29	38038	38018	* 38039
	37912	11	43									

* Commutating finger.

TYPE C CONTROLLERS

Controller	SINGLE FINGERS						SETS OF FINGERS	
	Operating			Reversing			Cat. No.	
	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Operating	Reversing
C- 6A	22960	11	7	22968	4	21	38065	38066
	* 22947	2	2					
C- 6K	22960	11	7	22968	4	21	38065	38066
	* 22947	2	2					
C-26A	37939	10	1				38075	
C-28C	22960	11	7	22968	4	21	38065	38066
	* 22947	2	2					
C-28D	22960	11	7	22968	4	21	38065	38066
	* 22947	2	2					
C-35A	37939	10	1				38075	
C-36C	37939	10	1				38075	
C-38A	22960	10	7	22968	4	21	103196	38066
	* 22947	2	2					

* Auxiliary brake finger.

CONTROLLER CONTACT FINGERS

TYPE C CONTROLLERS—(Concluded)

Controller	SINGLE FINGERS						SETS OF FINGERS	
	Operating			Reversing			Cat. No.	
	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Operating	Reversing
C-38B {	22960	10	7	22968	4	21	103196	38066
	* 22947	2	2					
C-38C {	22960	10	7	22968	4	21	103196	38066
	* 22947	2	2					
C-38D {	22960	10	7	22968	4	21	103196	38066
	* 22947	2	2					
C-71C	37939	12	1	22968	4	21	103206	38066
C-73B	103172	21	1	103185	6	21	103208	103210
C-74A	103172	13	1	22968	3	21	103205	103211
C-79A	103172	18	1	103185	3	21	103213	103214
C-80A	37939	12	1				103206	

* Auxiliary brake finger.

TYPE K CONTROLLERS

K- 2A	37946	12	55	37947	8	32	38091	38088
K- 6A	37911	15	48	37900	16	29	38095	38039
K- 6B	37911	15	48	37900	16	29	38095	38039
K- 6G	37911	15	48	37900	16	29	38095	38039
K- 6H {	37911	15	48	37900	16	29	46557	38039
	* 46556	2	22					
K- 8A	37924	11	56	37930	8	33	38096	38097
K- 9A	33802	11	53	37947	8	32	38098	38088
K-10A	33802	11	53	37947	8	32	38098	38088
K-10D	33802	11	53	37947	8	32	38098	38088
K-10F	33802	11	53	† 17595 }	8	22	38098	38088
K-11A	37924	11	56	37947	8	32	38098	38088
K-11C	37924	10	56	37930	8	33	38096	38097
				† 17595 }	8	22	38402	38097
K-11H {	37924	11	56	37930	8	33	67462	38097
	* 67451	2						
K-12A	110046	11	56	37930	8	33	110047	38094
K-13A	37904	21	56	37929 }	24	30	38083	38084
K-13E	37904	21	56	37749	24	30	38083	38084
K-14A	110046	21	56	37749	32	30	110049	38404
K-14B	110046	21	56	37749	32	30	110049	38404
K-27A {	37924	6	56	37930	8	33	38407	38097
	37922	7	42					
K-27C {	37724	6	56	37930	8	33	38407	38097
	37922	7	42					
K-28A	110046	14	56	33602	16	26	110051	38409
K-28E	110046	14	56	33602	16	26	110051	38409
K-28F {	110046	14	56	33602	16	26	110052	38409
	* 46554	2						
K-28J {	110046	14	56	33602	16	26	110052	38409
	* 46554	2						
K-28K {	110046	14	56	33602	16	26	110052	38409
	* 46554	2						
K-28N	107723	14		107726	8		107727	107728

* Auxiliary brake finger.

† Emergency reversing finger with support and lead wire.

CONTROLLER CONTACT FINGERS**TYPE K CONTROLLERS—(Concluded)**

Controller	SINGLE FINGERS						SETS OF FINGERS	
	Operating			Reversing			Cat. No.	
	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Operating	Reversing
K-29A	37911	13	48	37900	16	29	38406	38039
	37912	4	43					
K-34B	* 111077	9	61	67459	16	33	111081	67470
	† 111078	18	61					
K-34C	* 111077	9	61	67459	16	33	111081	67470
	† 111078	18	61					
K-34D	* 111077	9	61	67459	16	33	111081	67470
	† 111078	18	61					
K-35B	* 111077	15	61	67460	16	33	111082	67471
K-35C	* 111077	15	61	67460	16	33	111082	67471
K-35D	* 111077	15	61	67460	16	33	111082	67471
K-35E	* 111077	15	61	67460	16	33	111082	67471
K-36A	* 111077	11	61	67460	8	33	111083	67472
K-36B	* 111077	11	61	67460	8	33	111083	67472
K-37A	* 111077	15	61	67460	16	33	111082	67471

* Includes removable tip Cat. No. 111079.

† Includes removable tip Cat. No. 111080.

TYPE L CONTROLLERS

L-4A	37579	36	54				38081	
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TYPE R CONTROLLERS

R- 6A	37904	22	56	37749	24	30	38426	38084
R- 6B	37904	22	56				38426	
R- 9A	37904	23	56				38429	
R-11A	37949	9	54	37930	4	33	38430	38431
R-11B	37949	9	54	37930	4	33	38430	38431
R-12A	37949	9	54	37930	8	33	38430	38097
R-13A	37904	14	56				38031	
R-14A	37946	8	55	37969	8	32	38432	38433
R-14C	37946	8	55	37969	8	32	38432	38433
R-15A	37949	18	54	37971	8	47	38434	38435
R-16A	37949	16	54	37930	8	33	38437	38094
				37929	8	33		
R-17A	37949	9	54	37930	4	33	38430	38431
R-19A	37949	9	54	37930	8	33	38430	38097
R-21A	37904	14	56				38031	
R-22A	37949	8	54	37973	8	33	38439	38442
R-22C	37949	8	54	37973	8	33	38439	38442
R-27A	37904	14	56				38031	
R-27D	37904	14	56				38031	
R-27M	37904	14	56				38031	
R-28A	37902	11	41				38053	
R-28F	37902	11	41				38053	
R-28G	37902	11	41				38053	
R-28N	37902	11	41				38053	
R-28V	37902	11	41				38053	
R-29A	37949	9	54	37947	8	32	38430	108466
				37950	8	32		

CONTROLLER CONTACT FINGERS **TYPE R CONTROLLERS—(Concluded)**

Controller	SINGLE FINGERS						SETS OF FINGERS	
	Cat. No.	Operating	Fig. No.	Cat. No.	Reversing	Fig. No.	Cat. No.	
		Number in Set			Number in Set		Operating	Reversing
R-32A	37904	14	56				38031	
R-32B	37904	14	56				38031	
R-37A	37949	8	54	37973	9	33	38446	38447
	† 56766	2	31					
R-37B	37949	8	54	37973	9	33	38446	38447
	† 56766	2	31					
R-37F	37949	8	54	37973	9	33	38446	38447
	† 56766	2	31					
R-38A	37946	8	55	37969	9	32	38449	43228
	† 56766	2	31					
R-53A	37976	8	13				38454	
R-53B	37976	8	13				38454	
R-53C	37976	8	13				38454	
R-56A	34411	6	59				38458	
R-60A	29362	6	59	37749	10	30	38459	37940
	29363	8	39					
R-60C	29362	18	59	37749	10	30	38456	37940
	29363	6	39					
	29362	6	59					
R-65A	37968	3	19				38462	
R-75A	37989	7	10				38471	
R-75B	37989	7	10				38471	
R-75H	37989	7	10				38471	
R-75A2	37989	7	10				38471	
R-75A5	37989	7	10				38471	
R-75C5	37989	7	10				38471	
R-75E2	37989	7	10				38471	
R-76A	37989	7	10				38471	
R-76A2	37989	7	10				38471	
R-76A5	37989	7	10				38471	
R-76B2	37989	7	10				38471	
R-77A	29362	6	59	37749	20	30	38459	38472
	29363	8	39					
R-84A	37954	32	53				38478	
R-84C	37954	32	53				38478	
R-86A	37924	7	56	37973	9	33	38479	38447
	37922	2	42					
R-86B	37924	7	56	37973	9	33	38479	38447
	37922	2	42					
R-86D	37924	7	56	37973	9	33	38479	38447
	37922	2	42					
R-86E	37924	7	56	37973	9	33	38479	38447
	37922	2	42					
R-86F	37924	7	56	37973	9	33	38479	38447
	37922	2	42					
R-98A	61879	7	17				61881	
	61880	24	56					
R-99A	61879	7	17				61881	
	61880	24	56					
R-109A	* 111548	14	61	61844	9	62	111549	68987
R-112A	* 111548	24	61	61845	18	62	111550	68988
R-113A	* 111548	26	61	61845	17	62	111551	68989
R-114A	* 111548	26	61	61845	18	62	111551	68988
R-121A	37902	16	41				38422	
R-121B	37902	16	41				38422	
R-121C	37902	17	41				38464	

* Includes removable tip Cat. No. 111079.

† Auxiliary finger.

CONTROLLER CONTACT FINGERS TYPE T CONTROLLERS

Controller	SINGLE FINGERS						SETS OF FINGERS	
	Operating			Reversing			Cat. No.	
	Cat. No.	Number in Set	Fig. No.	Cat. No.	Number in Set	Fig. No.	Operating	Reversing
T-1A	37902	12	41				38082	
T-1G	37906	12	42				69033	
T-1H	37906	12	42				69033	
T-7A	37913	6	49	34402	16	50	38505	38506
	34401	11	44					
T-10A	36773	15	53				38507	
T-10J	37904	15	56				69034	
T-11A	37904	17	56				38508	
T-20A	37904	6	56				38056	
	37906	8	42					
T-20B	37904	6	56				38056	
	37906	8	42					
T-20C	37904	6	56					
	37906	8	42					
T-26A	37902	17	41				38056	
T-28A	37924	56	56	38009	18	25	38464	38520
T-29A	37924	56	56				38519	
T-34A	37902	14	41				38519	
T-34E	37906	14	42				38525	
T-36A	37922	28	42				69037	
T-40A	61918	16	8				69038	
T-42A	37922	58	42				61919	
T-42C	37922	54	42				69043	
T-42D	37922	54	42				69044	



Fig. 61

Controller Contact Fingers

Fig. 62

CONTROLLER CYLINDER SEGMENTS

TYPE B CONTROLLERS

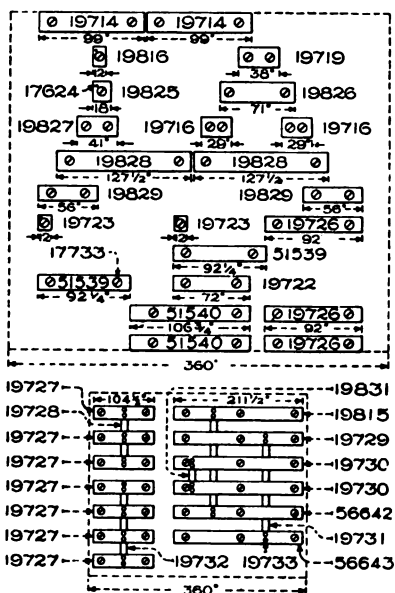
Controller cylinder segments are made from pure rolled copper rod, cold dropped to proper radius and cut to exact span dimensions to insure simultaneous break of all contacts in series.



In order to facilitate the identification and assortment of segments by the customer, all segments having the same catalogue number are assembled in a substantial package and a tag is attached giving quantity, catalogue number and the number of the requisition on which they are shipped.

OPERATING CYLINDER

B4-A Controller



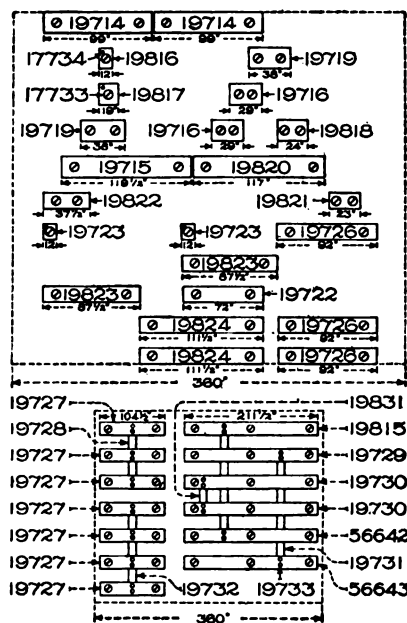
Cat. No.	Description
39466	Complete set segments, with screws, pins and rivets
17733	Screw for segments
17624	Pin for segments
19733	Rivet for segments

B6-A Controller

39467	Complete set segments, with screws, pins and rivets
17733	Screw for segments
17734	Pin for segments
19733	Rivet for segments

OPERATING CYLINDER

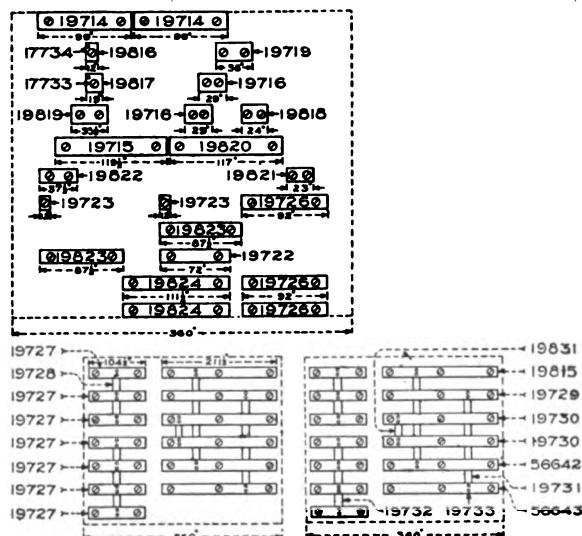
B3-A, B3-B, B3-G and B5-A Controllers



Cat. No.	Description
39450	Complete set segments, with screws, pins and rivets
17733	Screw for segments
17734	Pin for segments
19733	Rivet for segments

OPERATING AND AUXILIARY CYLINDERS

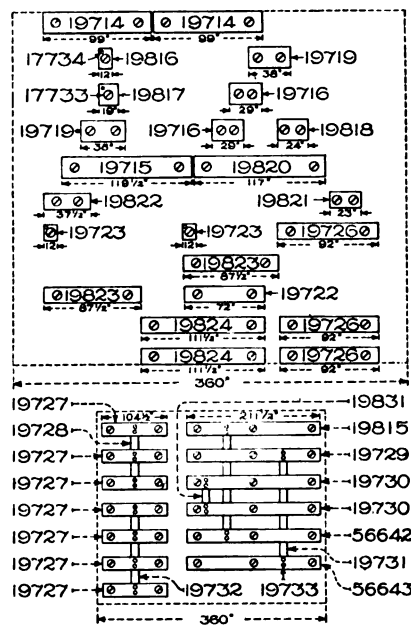
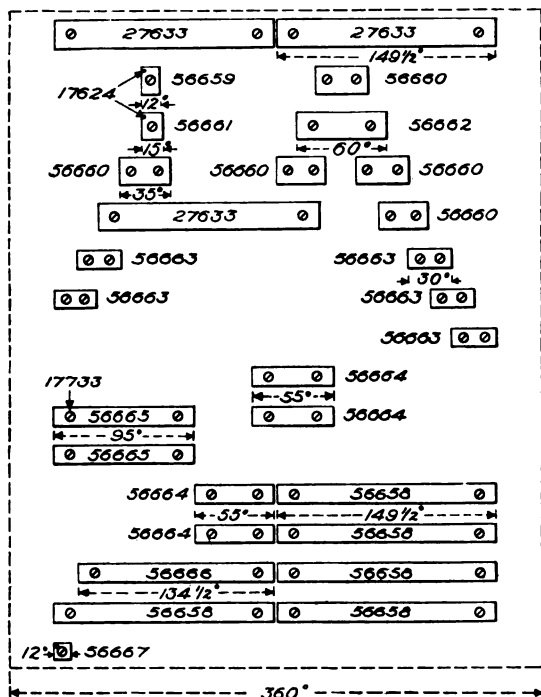
B6-A Controller



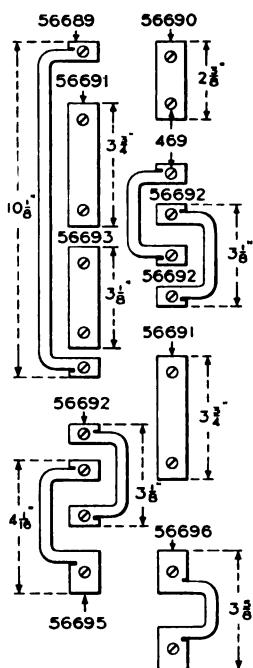
OPERATING CYLINDER

OPERATING CYLINDER

B18-A Controller



**B13-A, B13-B, B13-C,
B23-A and B24-A
Controllers**



Cat. No.	Description
39471	Complete set segments, with screws and pins
17733	Screw for segments
17624	Pin for segments

Cat. No.	Description
39474	Complete set segments, with screws, pins and rivets
17733	Screw for segments
17734	Pin for segments
19733	Rivet for segments

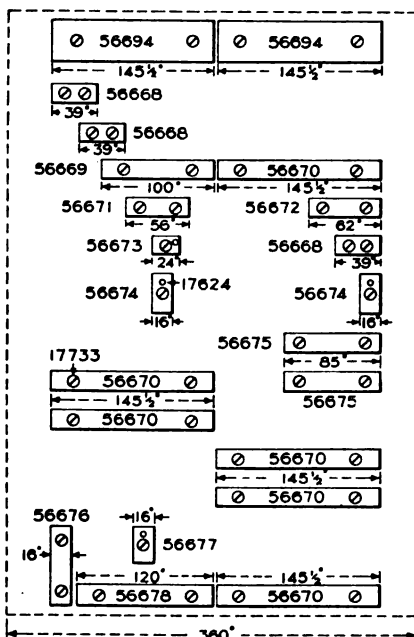
Cat. No.	Description
39472	Complete set of segments, with screws
469	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE B CONTROLLERS

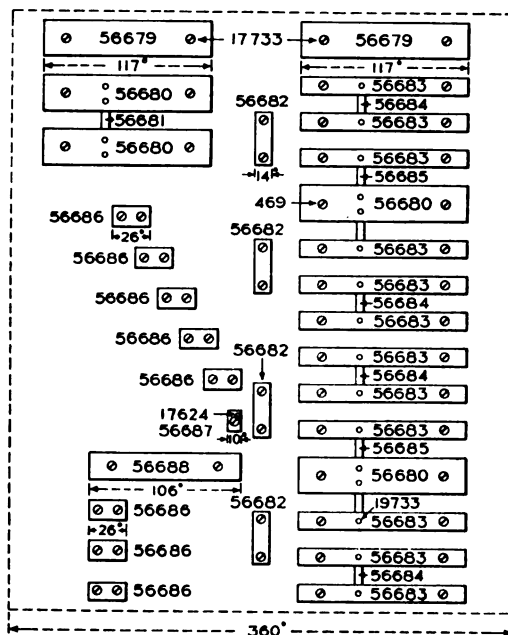
OPERATING CYLINDER

B19-A Controller



BRAKE CYLINDER

B19-A Controller



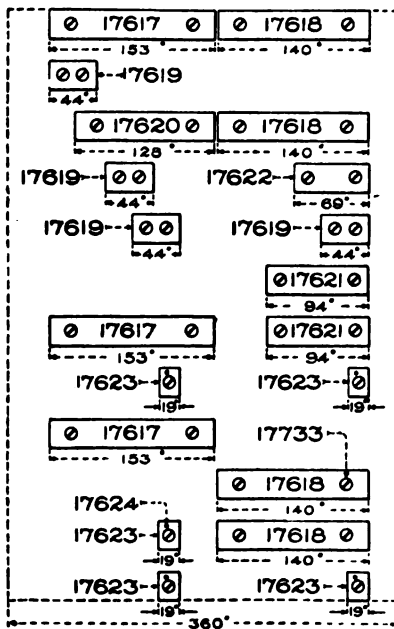
Cat. No.	Description
39475	Complete set segments, with screws and pins
17733	Screw for segments
17624	Pin for segments

Cat. No.	Description
39476	Complete set segments, with screws, pin and rivets
17733	Screw for segments
469	Screw for segments
17624	Pin for segments
19733	Rivet for segments

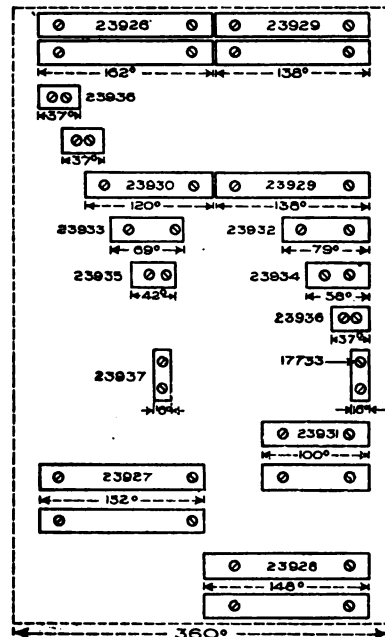
REVERSE SEGMENTS FOR B CONTROLLERS

Controller	Large Segment	CAT. NO.	
		Small Segment	Screw for Segment
B- 3A	14693	14692	19625
B- 3B	14693	14692	19625
B- 3G	14693	14692	19625
B- 4A	14693	14692	19625
B- 5A	14693	14692	19625
B- 6A	14693	14692	19625
B- 8A	56576	56575	9650
B- 8B	56576	56575	9650
B- 8C	56576	56575	9650
B-13A	14693	14692	19625
B-13B	14693	14692	19625
B-13C	14693	14692	19625
B-18A	14693	14692	19625
B-19A	14693	14692	19625
B-23A	14693	14692	19625
B-24A	14693	14692	19625

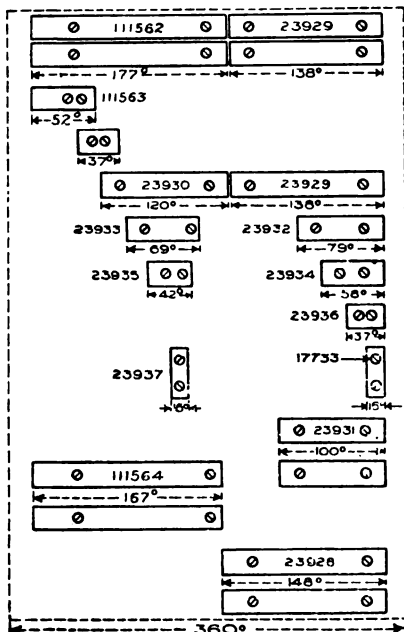
CONTROLLER CYLINDER SEGMENTS **TYPE K CONTROLLERS** **OPERATING CYLINDERS**

K2-A Controller

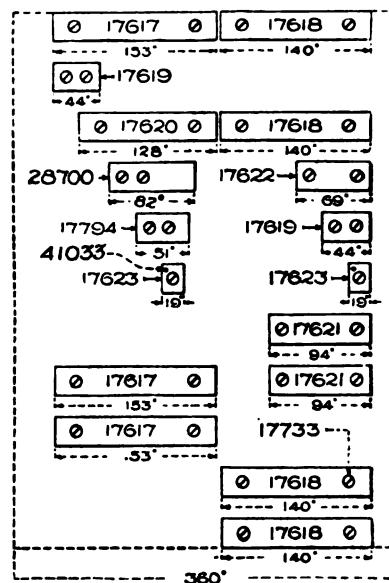
Cat. No.	Description
39444	Complete set of segments, with screws
17733	Screw for segments
17624	Pin for segments

K6-A, K6-B and K6-G Controllers

Cat. No.	Description
39445	Complete set of segments, with screws
17733	Screw for segments

K6-H Controller

111565	Complete set of segments, with screws
17733	Screw for segments

K8-A, K9-A, K10-A, K10-D, K10-F, K11-A, K11-C and K12-A Controllers

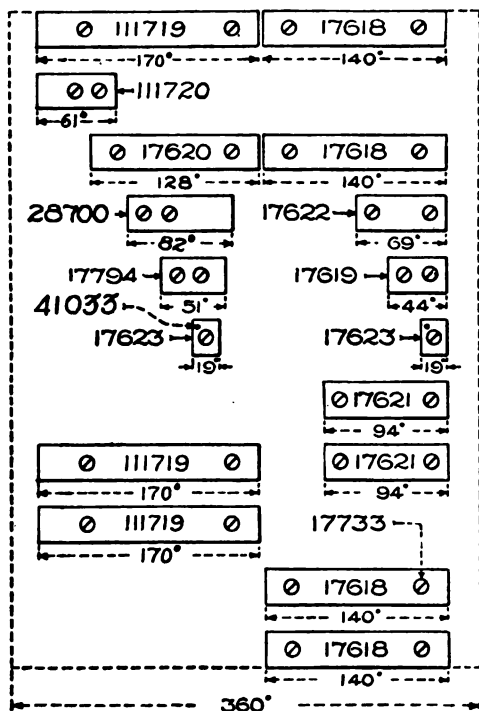
39446	Complete set of segments, with screws and pins
17733	Screw for segments
41033	Pin for segments

CONTROLLER CYLINDER SEGMENTS

TYPE K CONTROLLERS

OPERATING CYLINDER

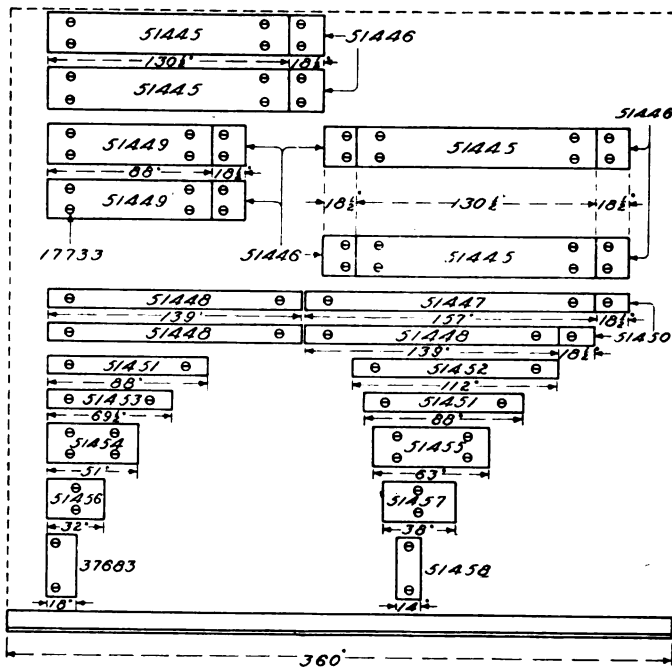
K11-H Controller



Cat. No.	Description
111721	Complete set of segments, with screws and pins
17733	Screw for segments
41033	Pin for segments

OPERATING CYLINDER

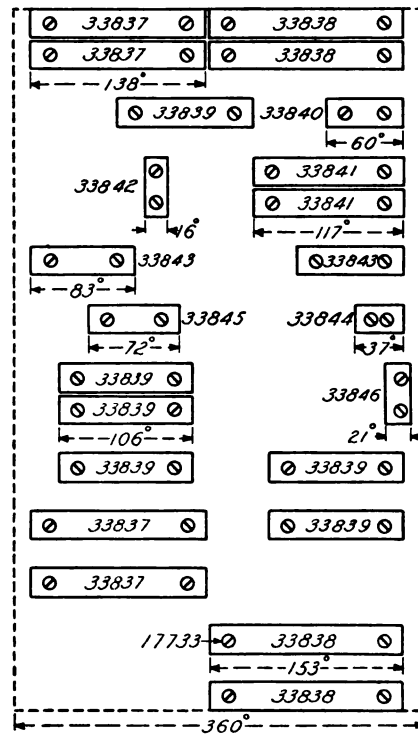
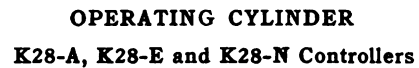
K13-A, K13-E, K14-A and K14-B Controllers



Cat. No.	Description
37684	Complete set of segments with screws
17733	Screw for segments

OPERATING CYLINDER

K27-A and K27-C Controllers



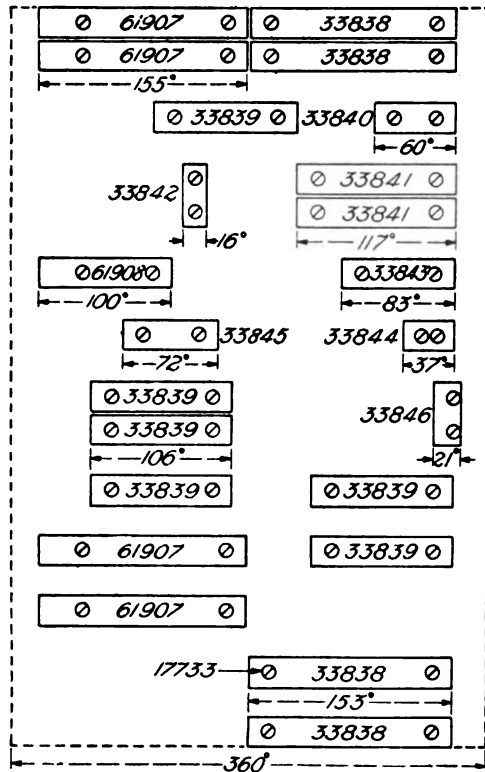
Cat. No.	Description
33463	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE K CONTROLLERS

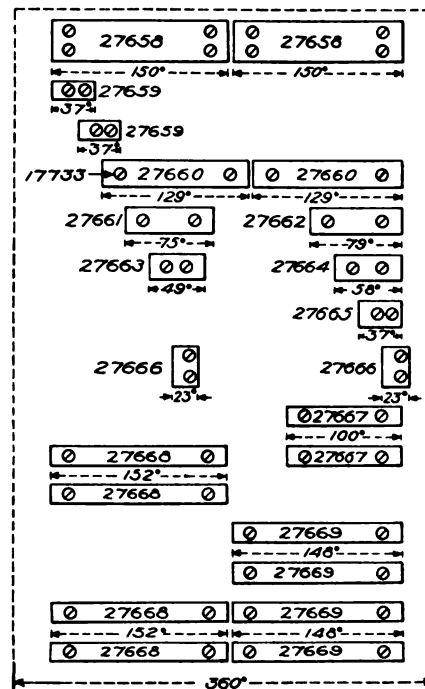
OPERATING CYLINDER

K28-F, K28-J and K28-K Controllers



OPERATING CYLINDER

K29-A Controller



Cat. No.	Description
61906	Complete set of segments with screws
17733	Screw for segments

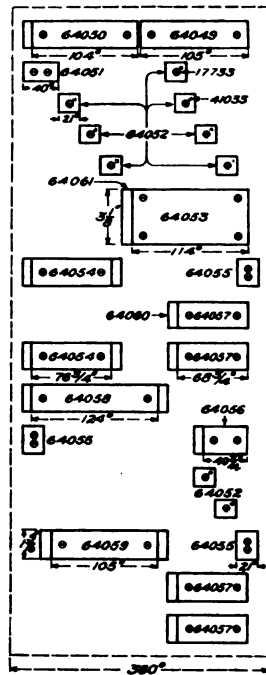
Cat. No.	Description
39448	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE K CONTROLLERS

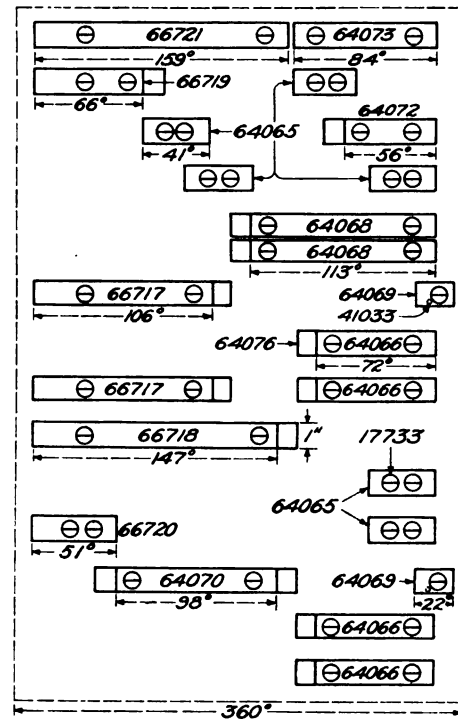
OPERATING CYLINDER

K34-B, K34-C and K34-D Controllers



OPERATING CYLINDER

K35-B Controller



Cat. No.	Description
64062	Complete set of segments, with burning tips, screws and pins
17733	Screw for segments
41033	Pin for segments

Cat. No.	Description
66906	Complete set of segments, with burning tips, screws and pins
17733	Screw for segments
41033	Pin for segments

CONTROLLER CYLINDER SEGMENTS

REVERSE SEGMENTS FOR K CONTROLLERS

CAT. NO.			
Controller	Large Segment	Small Segment	Screw for Segment
K 2-A	14693	14692	10194
K 6-A	14693	14692	19625
K 6-B	14693	14692	19625
K 6-G	14693	14692	19625
K 6-H	14693	14692	19625
K 8-A	14693	14692	10194
K 9-A	14693	14692	10194
K10-A	14693	14692	10194
K10-D	See page 220		
K10-F	14693	14692	10194
K11-A	14693	14692	10194
K11-C	See page 220		
K11-H	14693	14692	10194
K12-A	14693	14692	10194
K13-A	19960	19961	9650
K13-E	19960	19961	9650
K14-A	51425	51426	9650
K14-B	51425	51426	9650
K27-A	14693	14692	10194
K27-C	14693	14692	10194
K28-A	*33789		17733
K28-E	*33789		17733
K28-F	*33789		17733
K28-J	*33789		17733
K28-K	*33789		17733
K28-N	111711	111712	1424
K29-A	14693	14692	19625
K34-B	66900	66899	9650
K34-C	66900	66899	9650
K34-D	66900	66899	9650
K35-B	{ †66903 } { ‡66902 }	Δ66901	1424
K35-C	{ †66903 } { ‡66902 }	Δ66901	1424
K35-D	{ †66903 } { ‡66902 }	Δ66901	1424
K35-E	{ †66903 } { ‡66902 }	Δ66901	1424
K36-A	66905	66904	14192
K36-B	66905	66904	14192
K37-A	{ †66903 } { ‡66902 }	66901	1424

TYPE L CONTROLLERS

CYLINDER FOR L4 CONTROLLER

Cat. No.	Description
24172	Upper pipe section, with brass contact casting
24173	Lower pipe section, with brass contact casting
24175	Small removable copper contact tip
24176	Large removable copper contact tip
24211	Commutating segment
24177	Screw for segments

* Cylinder has but one size segment.

† Large size segment.

‡ Medium size segment.

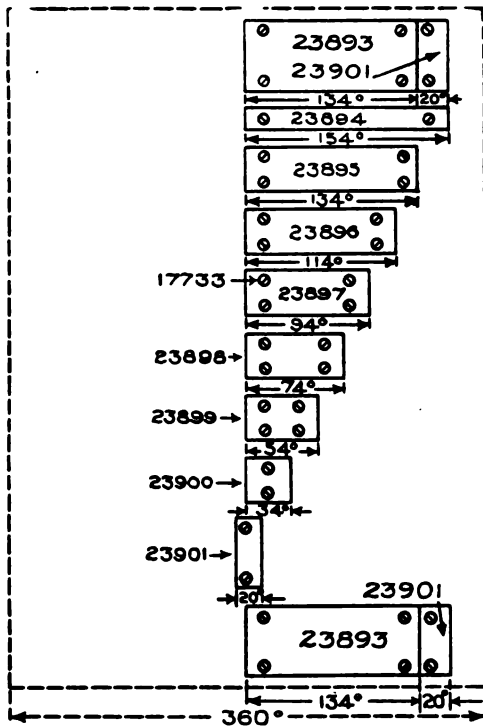
Δ Small size segment.

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

OPERATING CYLINDER

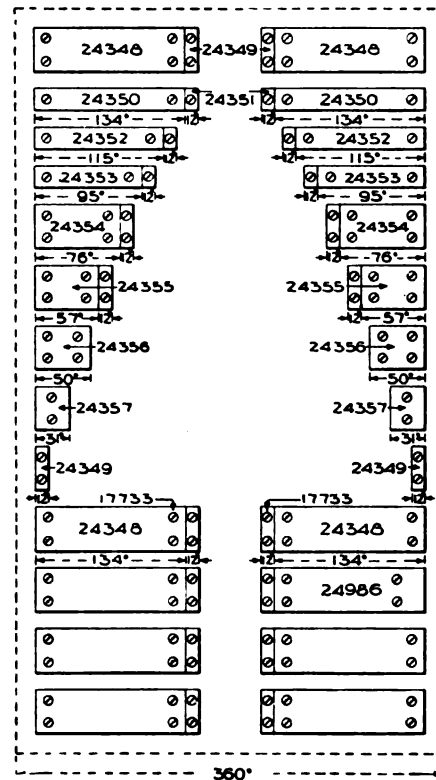
R6-A, R6-B Controllers



Cat. No.	Description
39478	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

R9-A Controller



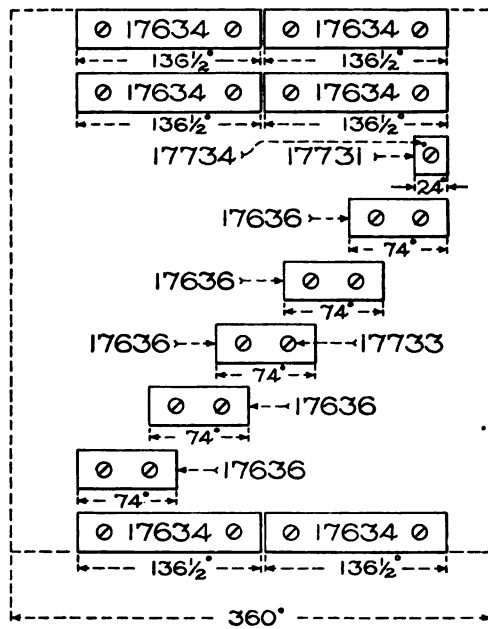
Cat. No.	Description
39479	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

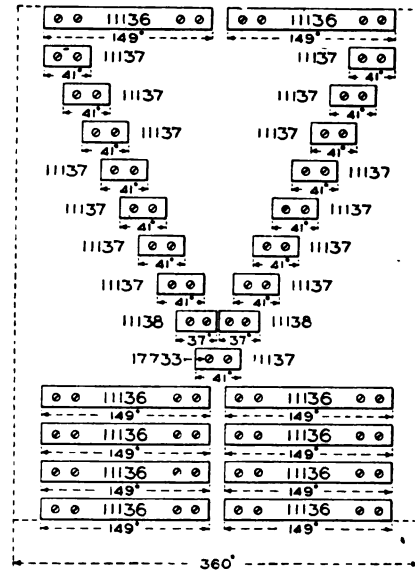
OPERATING CYLINDER

R11-A, R11-B, R12-A, R17-A, R19-A and R29-A
Controllers



OPERATING CYLINDER

R13-A and R21-A Controllers



Cat. No.	Description
39480	Complete set of segments, with screws and pins
17733	Screw for segments
17734	Pin for segments

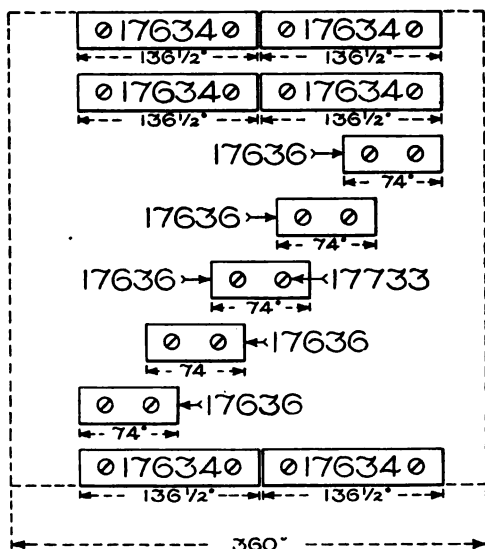
Cat. No.	Description
39481	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

OPERATING CYLINDER

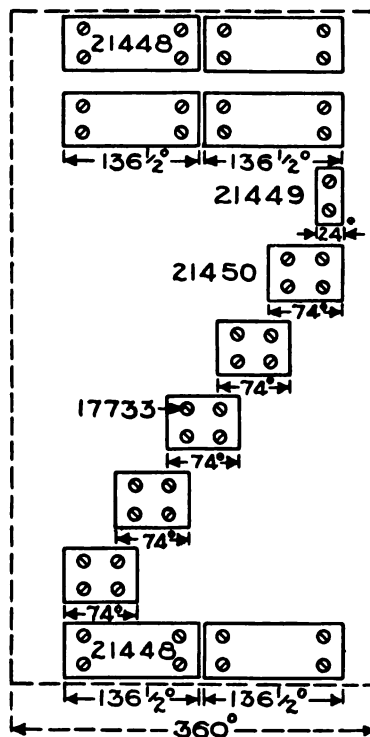
R14-A, R14-C, R22-A, R22-C, R37-A, R37-B, R37-F
and R38-A Controllers



Cat. No.	Description
39482	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

R15-A Controller



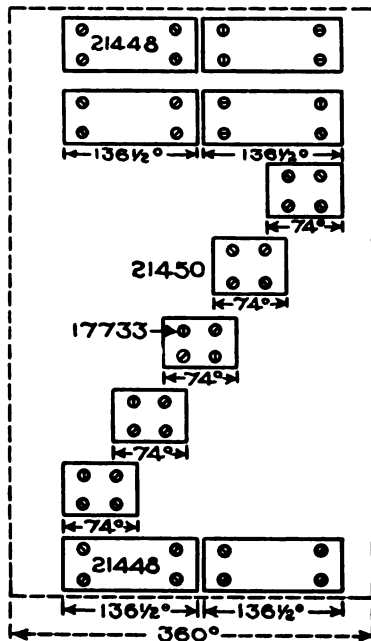
Cat. No.	Description
39483	Complete set of segments, with screws No. 17733 for R15-A, B, D and H controllers
64439	Complete set of segments, with screws No. 11220 for R15-C, E, F and G controllers
17733	Screw for segments
11220	Screw for segments (brass)

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

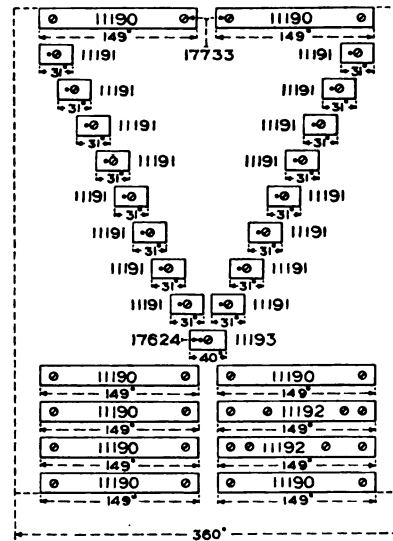
OPERATING CYLINDER

R16-A Controller



OPERATING CYLINDER

R27-A, R27-D, R27-M, R32-A and R32-B Controllers



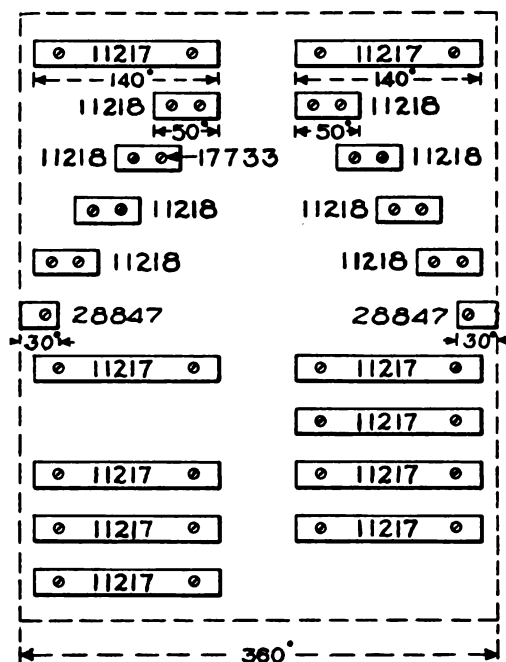
Cat. No.	Description
39484	Complete set of segments, with screws
17733	Screw for segments

Cat. No.	Description
39485	Complete set of segments, with screws and pins
17733	Screw for segments
17624	Pin for segments

CONTROLLER CYLINDER SEGMENTS

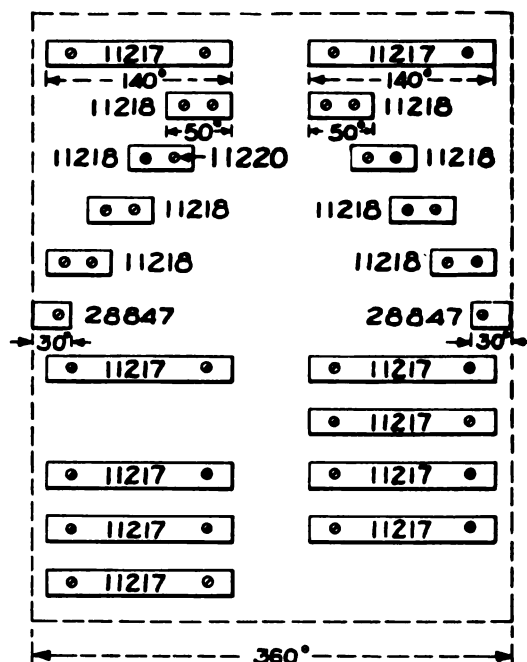
TYPE R CONTROLLERS

OPERATING CYLINDER R28-A, R28-G and R28-V Controllers



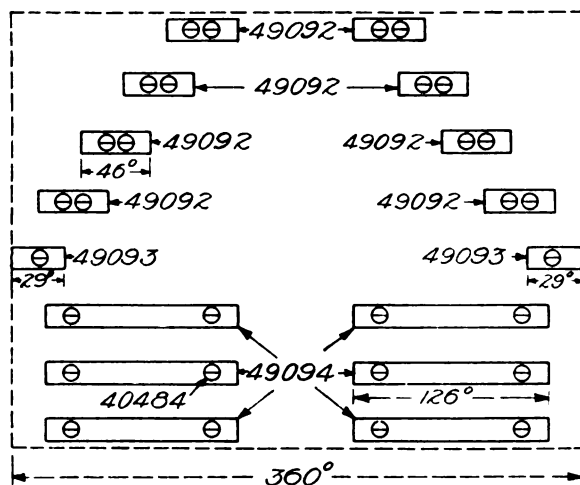
Cat. No.	Description
39486	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER R28-F, R28-N Controllers



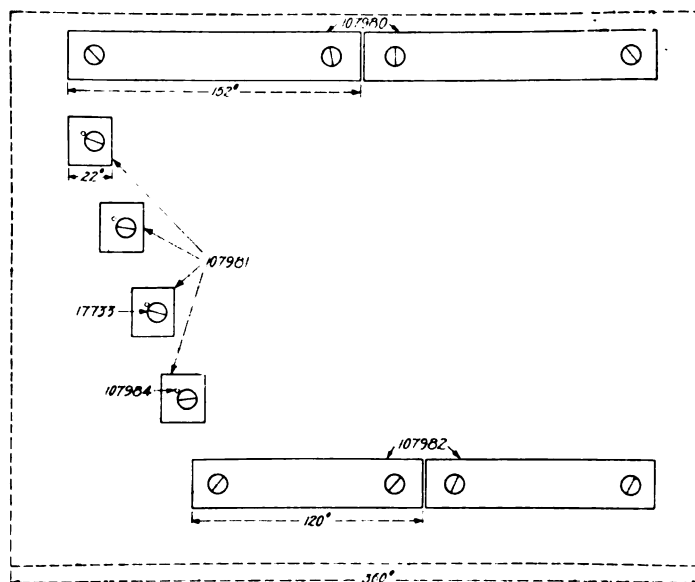
Cat. No.	Description
39488	Complete set of segments, with screws
11220	Screw for segments

OPERATING CYLINDER R53-A, R53-B and R53-C Controllers



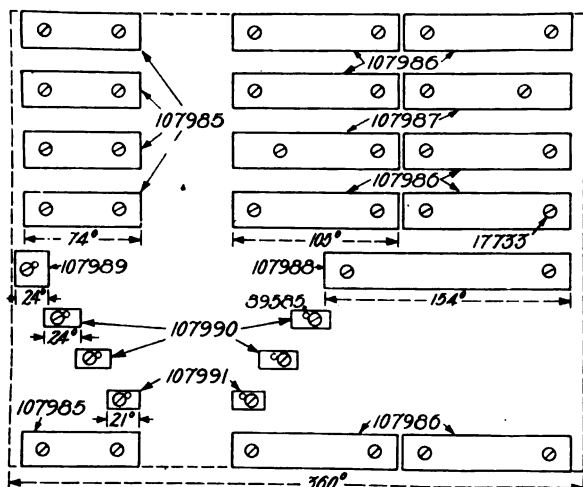
49077	Complete set of segments, with screws
111553	No. 40484, for R53-A controller
40484	Complete set of segments, with screws
59373	No. 59373, for R53-B and C controllers
	Screw for segments
	Screw for segments (brass)

OPERATING CYLINDER—R56-A Controller



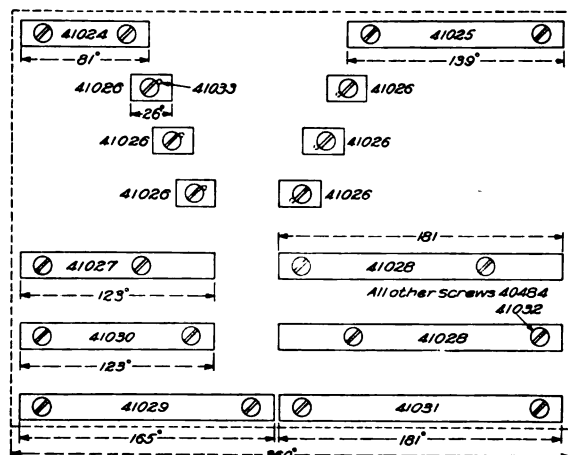
107983	Complete set of segments, with pins
17733	and screws
107984	Screw for segments
	Pin for segments

R65-A Controller



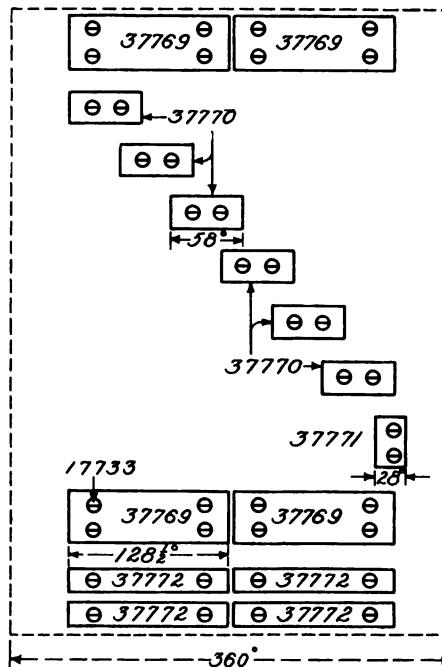
Cat. No.	Description
107992	Complete set of segments, with pins and screws
17733	Screw for segments
89585	Pin for segments

R75-A, R75-A2, R75-A5, R75-B, R75-C5, R75-E2 and R75-H Controllers



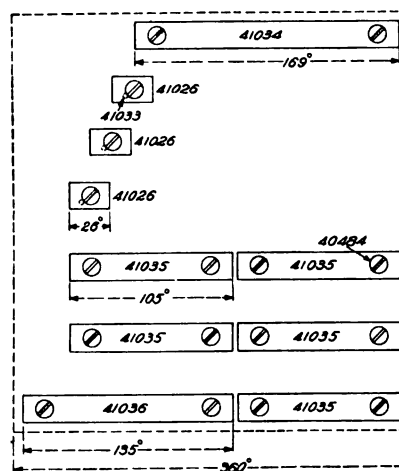
Cat. No.	Description
40982	Complete set of segments, with screws
40484	Screw for segments
41032	Screw for segments
41033	Pin for segments

R60-A, R60-C and R77-A Controllers



Cat. No.	Description
37719	Complete set of segments, with screws
17733	Screw for segments

R76-A, R76-A2, R76-A5 and R76-B2 Controllers



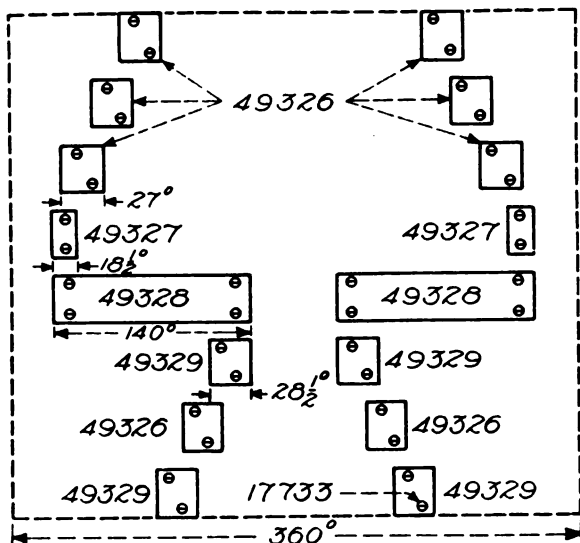
Cat. No.	Description
41018	Complete set of segments, with screws and pins
41033	Pin for segments
40484	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

OPERATING CYLINDER

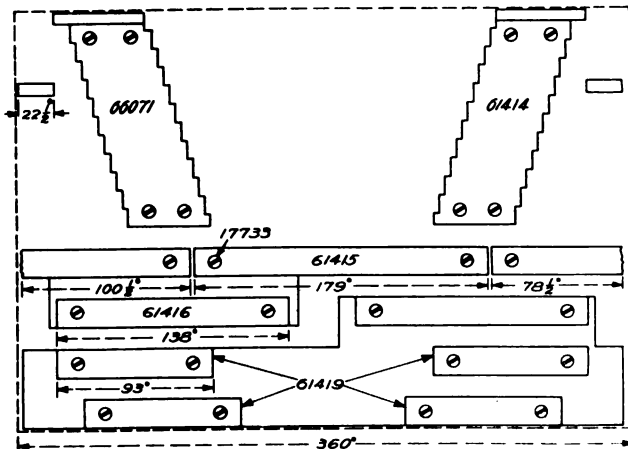
R84-A and R84-C Controllers



Cat. No.	Description
49356	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

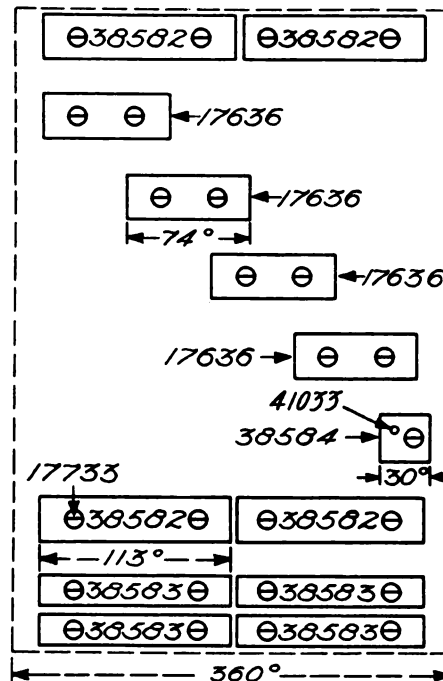
R98-A and R99-A Controllers



Cat. No.	Description
61869	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

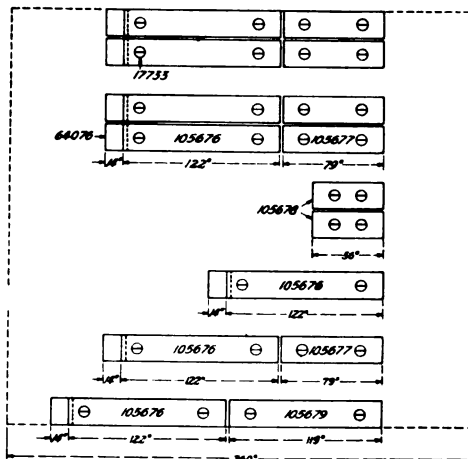
R86-A, R86-B, R86-D, R86-E, and R86-F Controllers



Cat. No.	Description
38532	Complete set of segments, with screws and pins
17733	Screw for segments
41033	Pin for segments

OPERATING CYLINDER

R109-A Controller

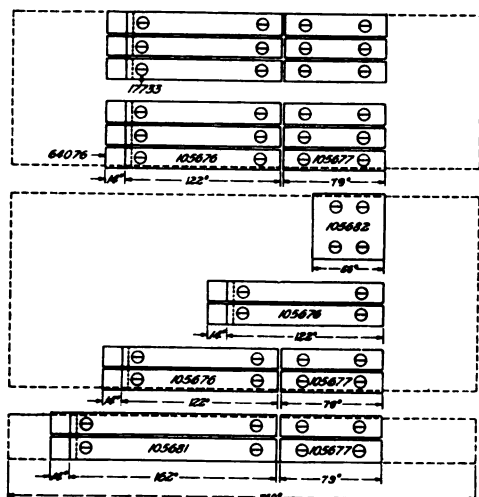


Cat. No.	Description
105680	Complete set of segments, with screws
17733	Screw for segments

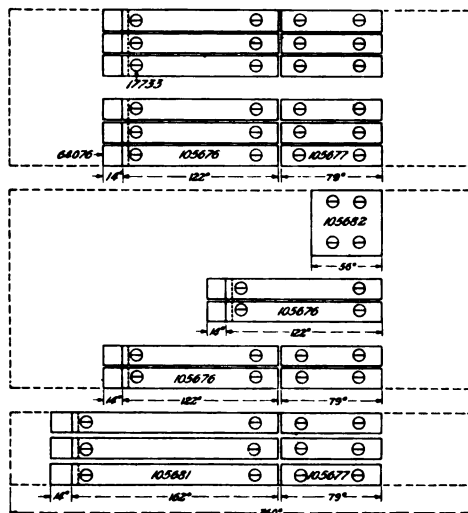
TYPE R CONTROLLERS

OPERATING CYLINDER

R113-A and R114-A Controllers



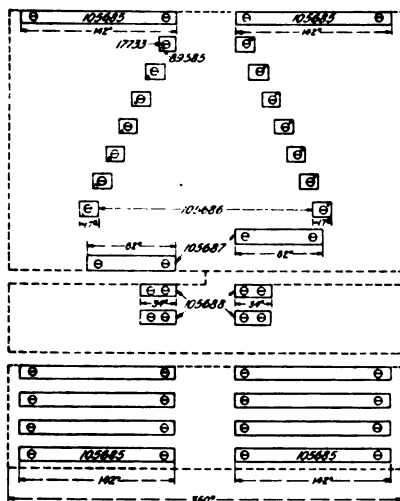
Cat. No.	Description
105683	Complete set of segments, with screws
17733	Screw for segments



Cat. No.	Description
105684	Complete set of segments, with screws
17733	Screw for segments

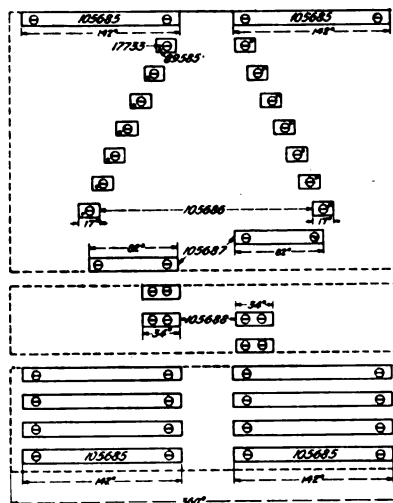
OPERATING CYLINDER

R121-C Controller



Cat. No.	Description
105689	Complete set of segments, with screws and pins, for R121-A
105690	Complete set of segments, with screws and pins, for R121-B
17733	Screw for segments
89585	Pin for segments

* The cylinder development shown is for R121-B, and the development for R121-A is identical except that the two left-hand segments, Cat. No. 105688 are omitted.



Cat. No.	Description
107677	Complete set of segments, with screws and pins
17733	Screw for segments
89585	Pin for segments

CONTROLLER CYLINDER SEGMENTS **TYPE R CONTROLLERS—REVERSE SEGMENTS**

Controller	CAT. NO.		
	Large Segment	Small Segment	Screw for Segment
R 6-A	19960	19961	9650
R 6-B	No reverse cylinder		
R 9-A	No reverse cylinder		
R11-A	14693	14692	10194
R11-B	14693	14692	10194
R12-A	14693	14692	10194
R13-A	No reverse cylinder		
R14-A	14693	14692	10194
R14-C	14693	14692	10194
R15-A	19247	19246	10143
R16-A	21442	21441	10194
R17-A	14693	14692	10194
R19-A	14693	14692	10194
R21-A	No reverse cylinder		
R22-A	14693	14692	10194
R22-C	14693	14692	10194
R27-A	No reverse cylinder		
R27-D	No reverse cylinder		
R27-M	No reverse cylinder		
R28-A	No reverse cylinder		
R28-F	No reverse cylinder		
R28-G	No reverse cylinder		
R28-N	No reverse cylinder		
R28-V	No reverse cylinder		
R29-A	14693	14692	10194
R32-A	No reverse cylinder		
R32-B	No reverse cylinder		
R37-A	See page 231		
R37-B	See page 231		
R37-F	See page 231		
R38-A	See page 231		
R53-A	No reverse cylinder		
R53-B	No reverse cylinder		
R53-C	No reverse cylinder		
R56-A	No reverse cylinder		
R60-A	Δ37726 †37727	37728	13848
R60-C	Δ37726 †37727	37728	13848
R65-A	No reverse cylinder		
R75-A	No reverse cylinder		
R75-B	No reverse cylinder		
R75-H	No reverse cylinder		
R75-A2	No reverse cylinder		
R75-A5	No reverse cylinder		
R75-C5	No reverse cylinder		
R75-E2	No reverse cylinder		
R76-A	No reverse cylinder		
R76-A2	No reverse cylinder		
R76-A5	No reverse cylinder		
R76-B2	No reverse cylinder		
R77-A	See page 231		
R84-A	No reverse cylinder		
R84-C	No reverse cylinder		
R86-A	See page 232		
R86-B	See page 232		
R86-D	See page 232		
R86-E	See page 232		
R86-F	See page 232		
R98-A	No reverse cylinder		
R99-A	No reverse cylinder		
R109-A	See page 232		
R112-A	See page 233		
R113-A	See page 233		
R114-A	See page 233		
R121-A	No reverse cylinder		
R121-B	No reverse cylinder		
R121-C	No reverse cylinder		

Δ Four screw segment.

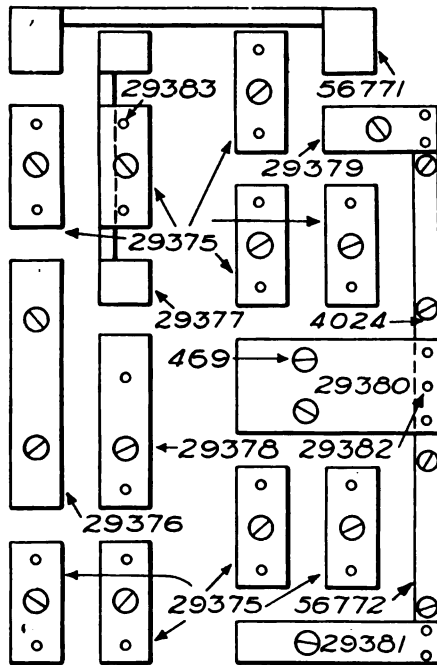
† Large segment, 2 screw.

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS—REVERSE SEGMENTS

REVERSING CYLINDER

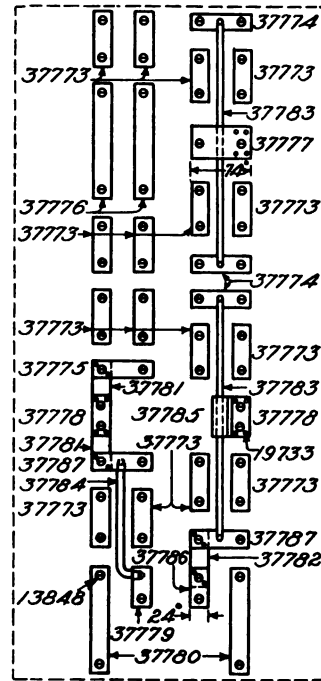
R37-A, R37-B, R37-F and R38-A Controllers



Cat. No.	Description
39489	Complete set of segments, with screws
469	Screw for segments
4024	Screw for segments (Brass)
29382	Copper rivet for segments
29383	Pin for segments

REVERSING CYLINDER

R77-A Controller

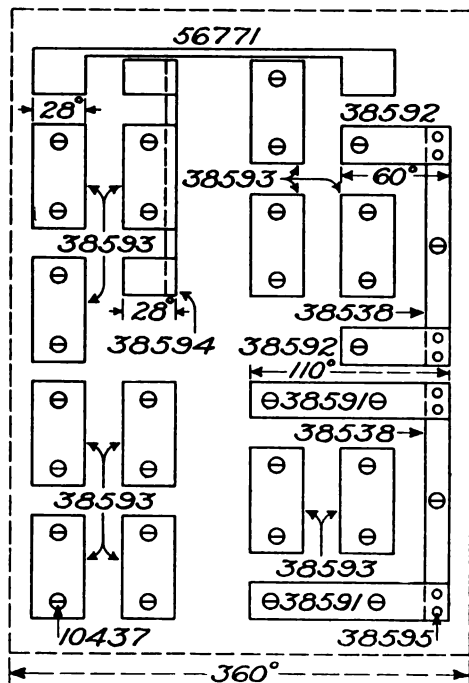


Cat. No.	Description
37759	Complete set of segments, with connectors, screws and pins
13848	Screw for segments
19733	Pin for segments

CONTROLLER CYLINDER SEGMENTS TYPE R CONTROLLERS

REVERSING CYLINDER

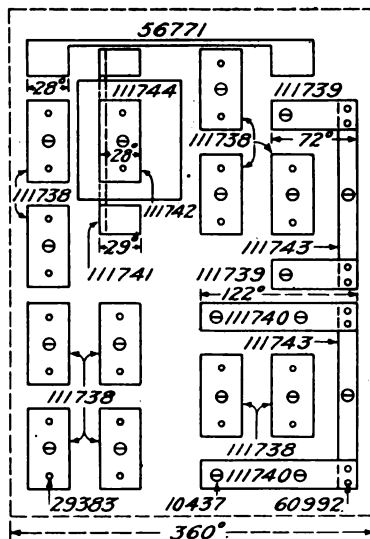
R86-A, R86-B and R86-D Controllers



Cat. No.	Description
38536	Complete set of segments, with screws and rivets
10437	Screw for segments
38595	Copper rivet

REVERSING CYLINDER

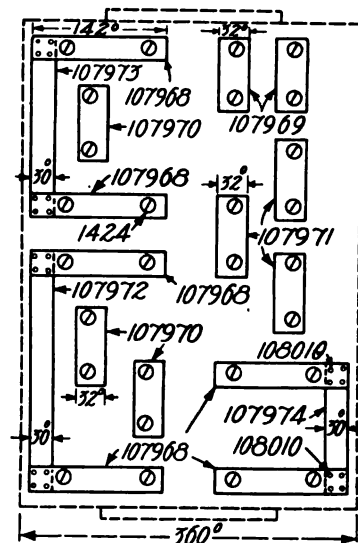
R86-E and R86-F Controllers



Cat. No.	Description
111745	Complete set of segments, with connection strips, insulation plate, screws, rivets and pins
10437	Screw for segments
60992	Rivet for segments
29383	Pin for segments

REVERSING CYLINDER

R109-A Controller



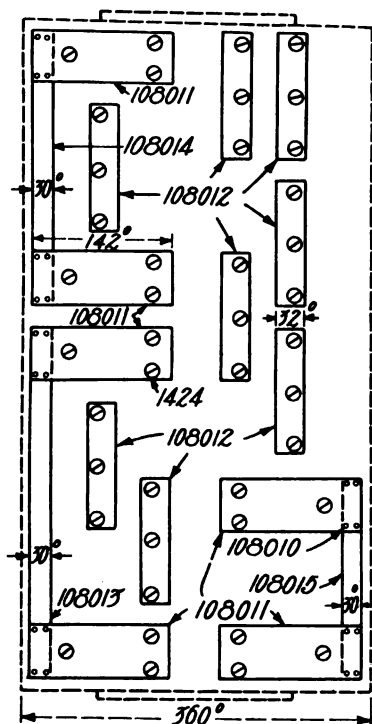
Cat. No.	Description
108009	Complete set of segments, with connection strips, screws and rivets
1424	Screw for segments
108010	Rivet for segments

CONTROLLER CYLINDER SEGMENTS

TYPE R CONTROLLERS

REVERSING CYLINDER

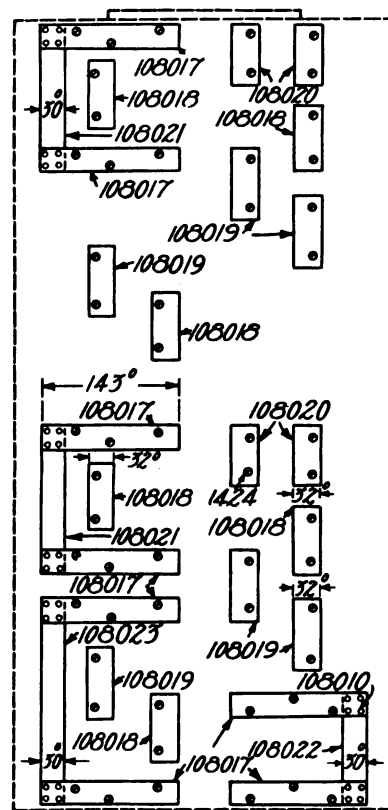
R112-A Controller



Cat. No.	Description
108016	Complete set of segments, with connection strips, screws and rivets
1424	Screw for segments
108010	Rivet for segments

REVERSING CYLINDER

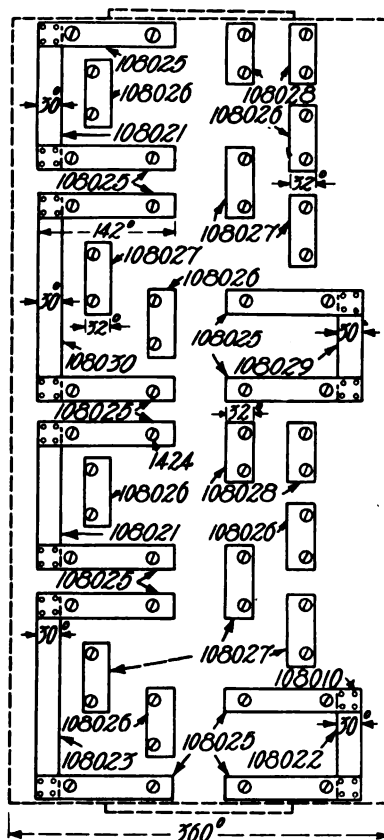
R113-A Controller



Cat. No.	Description
108024	Complete set of segments, with connection strips, screws and rivets
1424	Screw for segments
108010	Rivet for segments

REVERSING CYLINDER

R114-A Controller



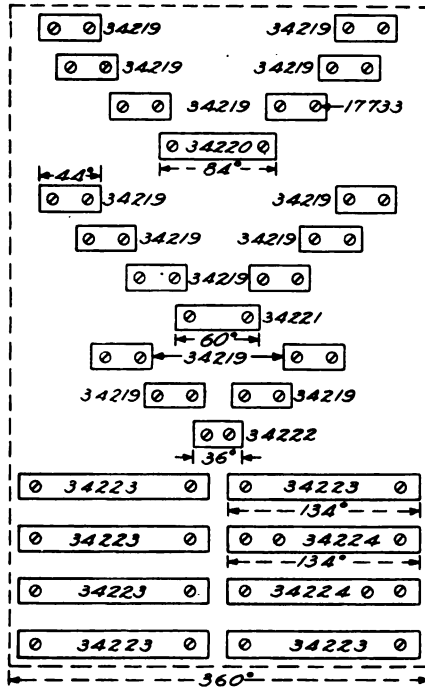
Cat. No.	Description
108031	Complete set of segments, with connection strips, screws and rivets
1424	Screw for segments
108010	Rivet for segments

CONTROLLER CYLINDER SEGMENTS

TYPE T CONTROLLERS

OPERATING CYLINDER

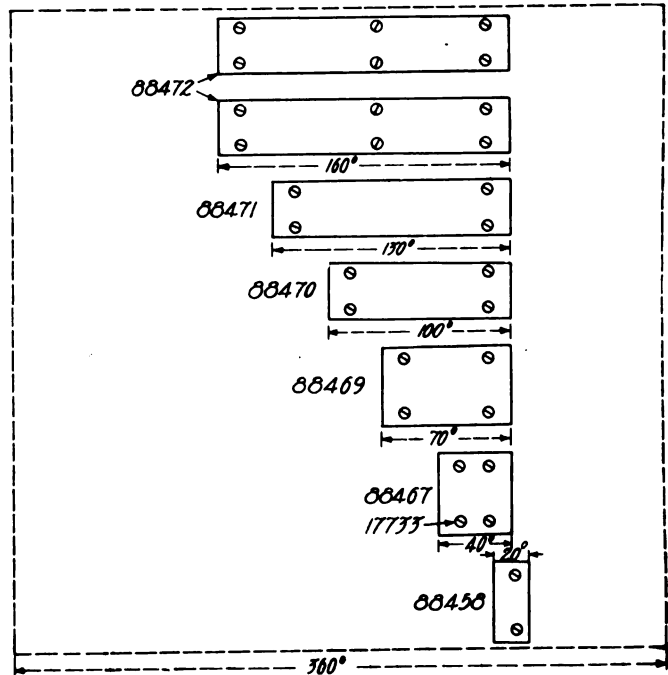
T10-A and T10-J Controllers



Cat. No.	Description
34403	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

T11-A Controller



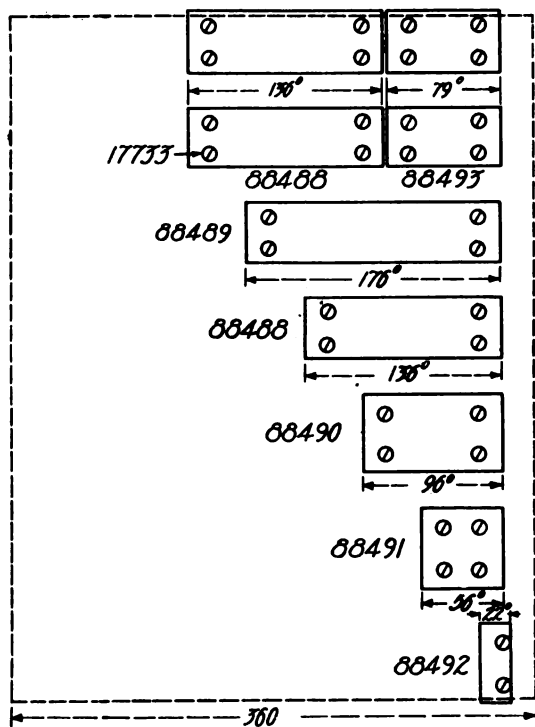
Cat. No.	Description
88473	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE T CONTROLLERS

OPERATING CYLINDER

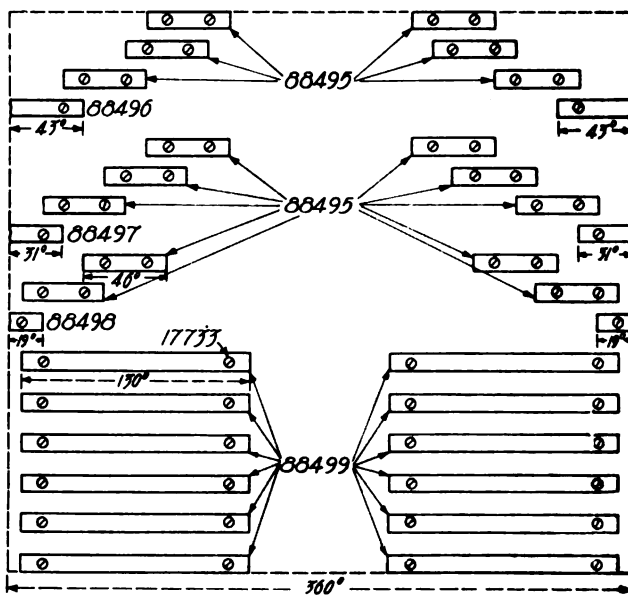
T20-A, T20-B and T20-C Controllers



Cat. No.	Description
88494	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER

T26-A Controller

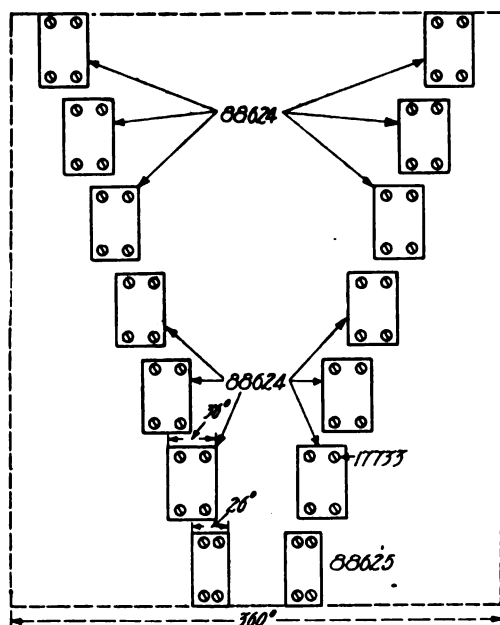


Cat. No.	Description
88623	Complete set of segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

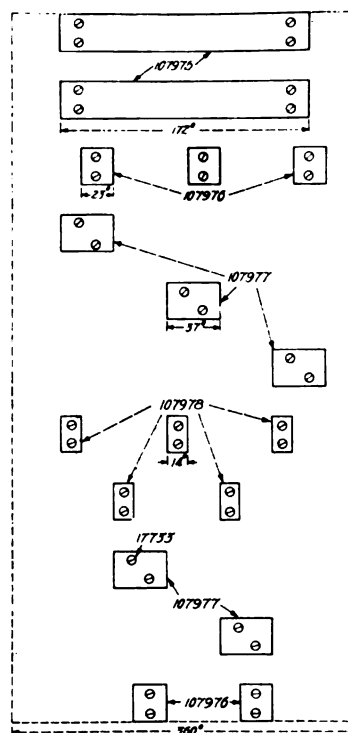
TYPE T CONTROLLERS

OPERATING CYLINDER
T28-A and T29-A Controllers



Cat. No.	Description
88626	Complete set of segments, with screws
17733	Screw for segments

OPERATING CYLINDER
T33-A Controller



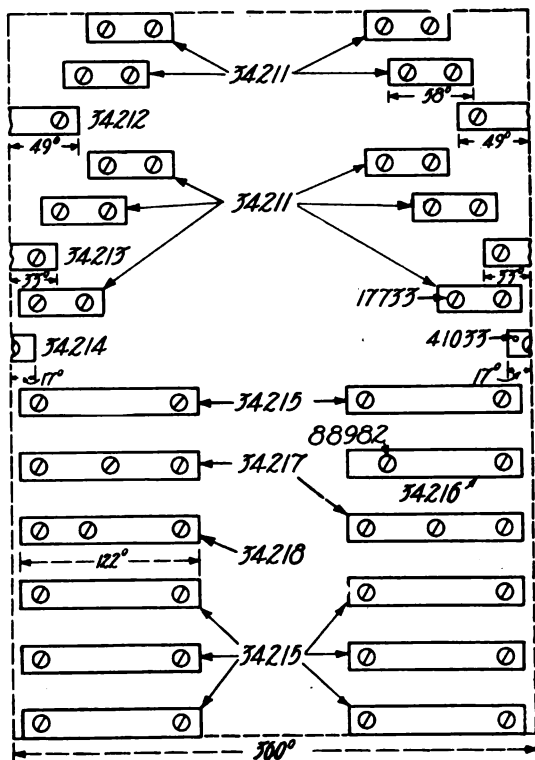
Cat. No.	Description
107979	Complete set of contact segments, with screws
17733	Screw for segments

CONTROLLER CYLINDER SEGMENTS

TYPE T CONTROLLERS

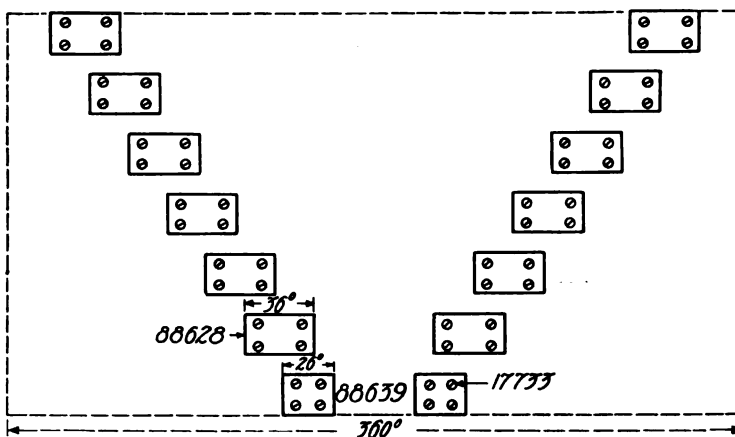
OPERATING CYLINDER

T34-A and T34-E Controllers



OPERATING CYLINDER

T36-A Controller



Cat. No.

Description

88640
17733

Complete set of segments, with screws
Screw for segments

T34-A and T34-E Controllers

88627
17733
88982
41033

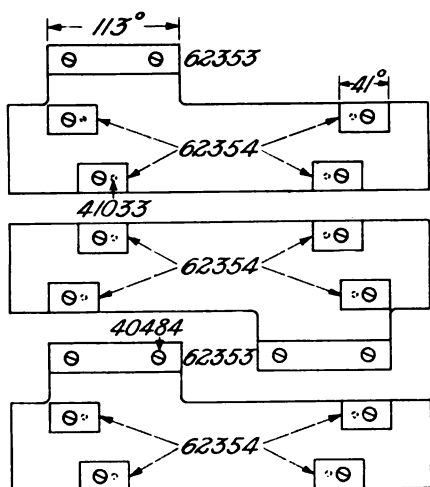
Complete set of segments, with screws
and pins
Short screw for segments
Long screw for segments
Pin for segments

CONTROLLER CYLINDER SEGMENTS

TYPE T CONTROLLERS

OPERATING CYLINDER

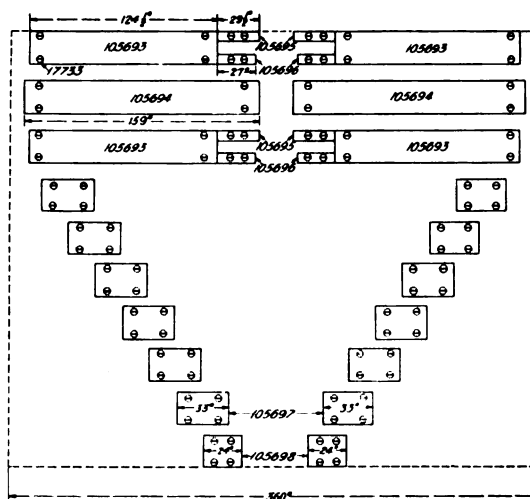
T40-A Controller



Cat. No.	Description
60446	Complete set of segments, with screws and pins
40484	Screw for segments (10-24, $\frac{1}{2}$ " F.H. blued, special)
41033	Pin for segments

OPERATING CYLINDER

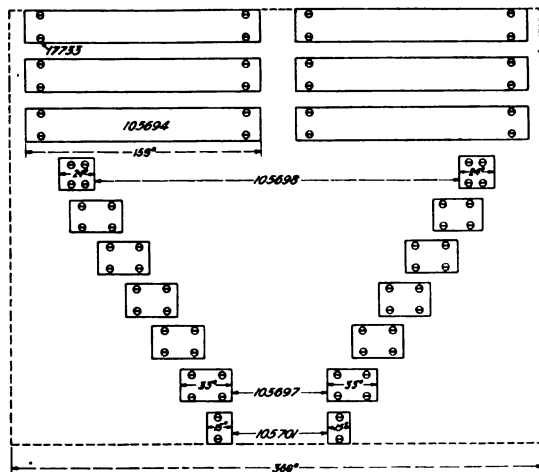
T42-A Controller



Cat. No.	Description
105699	Complete set of segments, with screws
17733	Screw for segments (14-24, $\frac{1}{2}$ " F.H. blued, special)

OPERATING CYLINDER

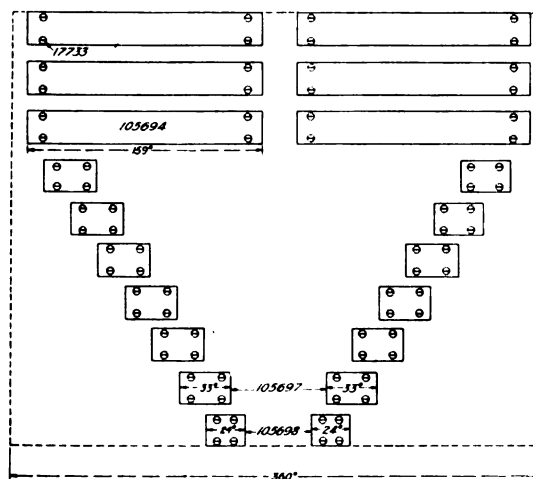
T42-C Controller



Cat. No.	Description
105700	Complete set of segments, with screws
17733	Screw for segments (14-24, $\frac{1}{2}$ " F.H. blued, special)

OPERATING CYLINDER

T42-D Controller



Cat. No.	Description
105702	Complete set of segments, with screws
17733	Screw for segments (14-24, $\frac{1}{2}$ " F.H. blued, special)

ARC DEFLECTORS AND PARTS



The following tables give catalogue numbers for Arc Deflectors complete, and separately for their insulation parts. The various parts are moulded to exact dimensions from a compound which offers high resistance to heat or puncture, is impervious to moisture, and uniformly strong and tough.

TYPE B CONTROLLERS

Controller	Description	CAT. NO.					
		Arc Deflector Complete	Wide Strip	Narrow Strip	Division Plate	Insulating Bushing for Screw Fastening Deflector to Pole Piece	Misc.
B-3A, B-3B, B-3G, B-4A & B-5A	Right-hand	19743	19738		{ A 19745 B 19746	D 19630 E 19629	
	Left-hand	19742	19737		{ A 19744 C 19745 B 19746	D 19630 E 19629	
B-6A	Right-hand	51582	51545		{ A 19745 B 19746	D 19630 E 19629	
	Left-hand	19742	19737		{ A 19744 C 19745 B 19746	D 19630 E 19629	F 19633
B-8A, B-8B & B-8C	Control Cylinder	56535	56537	56539	{ G 56542 H 56541	19630	
	Brake Cylinder	56536	56538	56540	19636	19630	
B-13A, B-13B & B-13C		I 51602	51603	51604	51605	19630	J 51631
B-18A	Right-hand	19743	19738		{ A 19745 B 19746	D 19630 E 19629	
	Left-hand	19742	19737		{ A 19744 C 19745 B 19746	D 19630 E 19629	
B-19A	Control Cylinder	51733	51734	{ K 51735 L 51736	51737	13635	M 51738
	Brake Cylinder	51740	51741	51742	19895	13625	
B-23A & B-24A		I 51602	51603	51604	51605	19630	J 51631

TYPE L CONTROLLER

L-4A	24163	24164	24165	24166	13635
------	-------	-------	-------	-------	-------

A—Large.
B—Small.
C—Medium.
D—Short.
E—Long.

F—Square fibre plate.
G—Intermediate and lower end.
H—Upper end.
I—Includes shield for pole piece.

J—Leatheroid shield for pole piece.
K—Right-hand.
L—Left-hand.
M—Top shield.

ARC DEFLECTORS AND PARTS

TYPE K CONTROLLERS

Controller	CAT. NO.					Misc.
	Arc Deflector Complete	Wide Strip	Narrow Strip	Division Plate	Insulating Bushing for Screw Fastening Deflector to Pole Piece	
K-2A	17611	17612	17613	14994	13635	
K-6A & K-6B	27539	56793	56794	{ A 56795 B 51737 C 27540 }	13635	
K-6G & K-6H	27539	56793	56794	{ A 56795 B 51737 C 27540 }	13635	
K-8A, K-9A, K-10A, K-10D & K-10F	14991	14992	14993	{ D 14994 C 56756 }	13635	
K-11A & K-11C	19873	14992	14993	14994	13635	E 19874
K-11H	14991	14992	14993	{ D 14994 C 56756 }	13635	
K-12A	19876	14992	14993	14994		E 19877
K-13A & K-13E	19924	19925	19926	19928	13635	
K-14A & K-14B	37928	19925	37936	19928	13635	
K14-E	110070	19925	19926	19928	13635	{ F 110071 G 110072 }
K-27A & K-27C	27486	27487	27488	{ D 14994 C 56756 }	13635	
K-28A, K-28E, K-28F, K-28J, K-28K & K-28N	33761	H 33766	I 33767	{ A 33764 B 33765 }	13635	J 33762
K-29A	27551	27552	27553	{ A 56795 B 51737 C 27540 }		
K-34B, K-34C & K-34D	110073	110075	110076	110077		J 110074
K-35B & K-35C	110078	{ K 110079 L 110080 }	110081	{ A 110084 B 110085 C 110082 M 110083 N 110085 C 110083 M 110082 C 110082 M 110083 O 110092 P 110085 Q 110093 R 110094 }		
K-36A & K-36B	110086	110087	110088			
K-37A	110089	110090	110091			

A—Large.

B—Small.

C—Upper end.

D—Except upper end.

E—Fibre shield plate.

F—Long inside strip.

G—Short inside strip.

H—Long fibre brace for large division plates.

I—Short fibre brace for large division plates.

J—Back plate.

K—Outer.

L—Inner.

M—Lower end.

N—Intermediate.

O—Large intermediate.

P—Medium intermediate.

Q—Small, offset on lower side.

R—Small, offset on upper side.

ARC DEFLECTORS AND PARTS

TYPE R CONTROLLERS

Controller	CAT. NO.					
	Arc Deflector Complete	Wide Strip	Narrow Strip	Division Plate	Insulating Bushing for Screw Fastening Deflector to Pole Piece	Misc.
R-6A & R-6B	22749	22725	22726	19928	13635	
R-9A	24320	24321	24322	19636	13635	
R-11A R-11B & R-12A	17642	17643	17644	14994	13635	
R-13A	19891	19894		19895	19893	
R-14A & R-14C	17690	17691	17692	{ A 14994 B 56756 }	13635	
R-15A	19238	19239	19240	{ A 14994 B 56756 }	19630	
R-16A	21433	21434	21435	14994	19630	
R-17A & R-19A	17642	17643	17644	14994	13635	
R-21A	19891	19894		19895	19893	
R-22A & R-22C	17690	17691	17692	{ A 14994 B 56756 }	13635	
R-27A, R-27D & R-27M	56722	c 56723	D 56724	{ C 110095 D 19636 }	19893	
R-28A	56856	56857		{ A 56858 B 56870 }	13635	
R-28F	56890			{ A 56858 B 56870 }	13635	E 56857
R-28B	56856			{ A 56858 B 56870 }	13635	E 56857
R-28N	56890			{ A 56858 B 56870 }	13635	E 56857
R-28V	56856			{ A 56858 B 56870 }	13635	E 56857
R-29A	17642	17643	17644	14994	13635	
R-32A & R-32B	56722	c 56723	D 56724	{ C 110095 D 19636 }	19839	
R-37A, R-37B, R-37F, & R-38A }	17690	17691	17692	{ A 14994 B 56756 }	13635	
R-53A, R-53B & R-53C	49071				49072	
R-56A	110096	110097	110098	19895	13635	
R-60A & R-60C	37713	37714	37715	19895	13635	
R-65A	110099	110507	110508	110509	13635	
R-75A, R-75A2 R-75A5, R-75B, R-75C5, R-75E2 R-75H, R-76A, R-76A2 R-76A5 & R-76B2 }				41002		
R-77A	37713	37714	37715	19895	13635	
R-84A & R-84C	110510			19745	19893	E 110511
R-86A, R-86B, R-86D, R-86E & R-86F }	38528	38529	38530	{ G 14994 F 56756 }	13635	
R-98A	{ H 110512 I 110513 }			33765	13635	E 110514
R-109A	110516	110518	110519	33765	13635	E 110515
R-112A	110521	110523	110524	110520		E 110517
R-113A & R-114A	110525	110527	110528	110520		E 110522
R-121A	110529			19745	19893	E 110526
R-121B & R-121C	110531			{ C 19745 D 110532 }	19893	E 110530

A-Intermediate and lower end.

B-Upper end.

c-Large.

D-Small.

E-Back plate.

F-Upper and lower ends.

G-Intermediate.

H-Right-hand.

I-Left-hand.

PRICE SUPPLEMENT

TO ACCOMPANY RAILWAY SUPPLY CATALOGUE, No. 4725

Controller Parts
Pages 206 to 249 Inclusive

Aug. 1, 1912

NOTE.—Prices subject to change without notice.

CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE
469—213,214,			17642—242.....	each	\$4.50	19819—211.....	each	\$0.22	23930—215.....	each	\$0.39
231.....	per 100	\$1.50	17643—242.....	each	1.35	19820—211,213.....	each	.43	23931—215.....	each	.32
1424—221,232,			17644—242.....	each	.75	19821—211,213.....	each	.16	23932—215.....	each	.26
233.....	per 100	2.00	17657—245.....	each	3.50	19822—211,213.....	each	.19	23933—215.....	each	.25
4024—231.....	each	.02	17670—246,247.....	each	3.65	19823—211,213.....	each	.30	23934—215.....	each	.22
9650—212,214,221,			17672—245.....	each	1.90	19824—211,213.....	each	.35	23935—215.....	each	.21
230.....	per 100	1.50	17690—242.....	each	4.00	19825—211.....	each	.15	23936—215.....	each	.18
10143—230.....	per 100	1.60	17691—242.....	each	1.00	19826—211.....	each	.30	23937—215.....	each	.17
10194—221,230.....	each	.01	17692—242.....	each	.60	19827—211.....	each	.22	24131—281.....	per 100	.20
10437—220,232.....	each	.01	17731—223.....	each	.13	19828—211.....	each	.46	24163—240.....	each	11.00
11136—223.....	each	.57	17733—211,212,213,214,			19829—211.....	each	.22	24164—240.....	each	3.75
11137—223.....	each	.23	215,216,217,218,			19830—211.....	each	2.25	24165—240.....	each	1.00
11138—223.....	each	.20	219,220,221,222,			19831—211,213.....	each	.09	24166—240.....	each	.40
11190—223.....	each	.52	223,224,225,226,			19832—245.....	each	9.00	24172—221.....	each	5.50
11191—225.....	each	.15	227,228,229,234,			19833—245.....	each	8.50	24173—221.....	each	23.00
11192—225.....	each	.55	235,236,237,238,			19839—242.....	each	.38	24175—221.....	each	.25
11193—225.....	each	.20	239.....	per 100	3.00	19873—241.....	each	5.25	24176—221.....	each	.65
11217—226.....	each	.31	17734—211,213,			19874—241.....	each	.25	24177—221.....	per 100	.75
11218—226.....	each	.14	223.....	per 100	.50	19876—241.....	each	5.25	24211—221.....	each	.76
11220—220,224,			17777—245.....	each	4.35	19877—241.....	each	.10	24320—242.....	each	7.25
226.....	per 100	3.75	17778—245,246,247			19891—242.....	each	6.50	24321—242.....	each	2.75
11299—246.....	each	5.50	249.....	each	2.40	19893—242.....	each	.03	24322—242.....	each	1.10
11314—246.....	each	2.50	17797—247.....	each	3.65	19894—242.....	each	2.00	24348—222.....	each	1.22
11371—247.....	each	8.00	17798—247.....	each	11.00	19895—240,242.....	each	.20	24349—222.....	each	.30
11478—247.....	each	25.50	17799—247,248,			19924—241.....	each	8.50	24350—222.....	each	.60
11479—247,249.....	each	23.00	249.....	each	8.50	19925—241.....	each	4.25	24351—222.....	each	.16
*13625—240			19238—242.....	each	8.75	19926—241.....	each	2.25	24352—222.....	each	.55
13635—240,241,			19239—242.....	each	2.25	19928—241,242.....	each	.35	24353—222.....	each	.50
242.....	each	.05	19240—242.....	each	.85	19960—221,230.....	each	.55	24354—222.....	each	.88
13848—230,231.....	per 100	.50	19246—230.....	each	.15	19961—221,230.....	each	.25	24355—222.....	each	.77
14192—221.....	per 100	.50	19247—230.....	each	.25	21433—242.....	each	8.75	24356—222.....	each	.73
14400—246.....	each	3.00	19625—214,220,			21434—242.....	each	1.65	24357—222.....	each	.42
14417—247,249.....	each	7.50	221.....	per 100	1.00	21435—242.....	each	.50	24986—222.....	each	1.22
14430—246.....	each	4.50	19629—240.....	each	.15	21441—230.....	each	.10	26791—246.....	each	25.50
14431—245.....	each	4.50	19630—240,242,			21442—230.....	each	.10	27486—241.....	each	6.50
14692—214,221,			243.....	each	.04	21448—224,225.....	each	1.35	27487—241.....	each	1.25
230.....	each	.10	19633—240.....	each	.15	21449—224.....	each	.46	27488—241.....	each	.70
14693—214,221,			19636—240,242.....	each	.20	21450—224,225.....	each	1.10	27539—241.....	each	6.85
230.....	each	.15	19714—211,213.....	each	.38	22725—242.....	each	3.85	27540—241.....	each	.30
14991—241.....	each	6.00	19715—121,213.....	each	.44	22726—242.....	each	2.35	27551—241.....	each	13.50
14992—241.....	each	1.20	19716—211,213.....	each	.19	22749—242.....	each	13.50	27552—241.....	each	2.25
14993—241.....	each	.75	19719—211,213.....	each	.21	22773—243.....	each	6.00	27553—241.....	each	.60
14994—241,242.....	each	.20	19722—211,213.....	each	.25	22775—243.....	each	2.00	27633—213.....	each	.71
16921—246,247,248,			19723—211,213.....	each	.13	22776—243.....	each	.20	27647—217.....	each	.39
249.....	each	4.15	19726—211,213.....	each	.30	22947—206,207.....	each	.20	27648—217.....	each	.15
16922—246,247,			19727—211,213.....	each	.14	22960—206,207.....	each	.28	27649—217.....	each	.27
249.....	each	2.35	19728—211,213.....	each	.13	22968—206,207.....	each	.03	27650—217.....	each	.30
17595—207.....	each	1.70	19729—211,213.....	each	.21	22975—249.....	each	8.50	27651—217.....	each	.26
17611—241.....	each	5.50	19730—211,213.....	each	.21	22976—249.....	each	9.75	27652—217.....	each	.23
17612—241.....	each	1.35	19731—211,213.....	each	.16	23893—222.....	each	2.00	27653—217.....	each	.18
17613—241.....	each	.75	19732—211,213.....	each	.15	23894—222.....	each	.85	27654—217.....	each	.18
17617—215,216.....	each	.40	19733—211,213,214,			23895—222.....	each	1.60	27655—217.....	each	.12
17618—215,216.....	each	.37	231.....	per 100	.20	23896—222.....	each	1.45	27656—217.....	each	.22
17619—215,216.....	each	.18	19737—240.....	each	1.25	23897—222.....	each	1.35	27657—217.....	each	.32
17620—215,216.....	each	.35	19738—240.....	each	.75	23898—222.....	each	1.05	27658—218.....	each	.79
17621—215,216.....	each	.28	19742—240.....	each	5.00	23899—222.....	each	.85	27659—218.....	each	.22
17622—215,216.....	each	.22	19743—240.....	each	2.75	23900—222.....	each	.64	27660—218.....	each	.49
17623—215,216.....	each	.12	19744—240.....	each	.35	23901—222.....	each	.58	27661—218.....	each	.39
17624—211,212,213,			19745—240,242.....	each	.30	23911—246.....	each	7.00	27662—218.....	each	.37
214,215,217,			19746—240.....	each	.30	23912—248.....	each	2.50	27663—218.....	each	.32
225.....	per 100	1.25	19815—211,213.....	each	.21	23926—215.....	each	.47	27664—218.....	each	.34
17634—223,224.....	each	.35	19816—211,213.....	each	.14	23927—215.....	each	.44	27665—218.....	each	.26
17636—223,224,			19817—211,213.....	each	.16	23928—215.....	each	.44	27666—218.....	each	.24
228.....	each	.23	19818—211,213.....	each	.17	23929—215.....	each	.42	27667—218.....	each	.28

* This Cat. No. appearing on page 240 should be 13635.

† This Cat. No. appearing on page 242 should be 19893.

PRICE SUPPLEMENT TO ACCOMPANY RAILWAY SUPPLY CATALOGUE, No. 4725

CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE
27668—218.....	each	\$0.47	34202—234.....	each	\$0.38	37781—231.....	each	\$0.71	38065—206.....	per set	\$3.48
27669—218.....	each	.42	34203—234.....	each	.41	37782—231.....	each	.65	38066—206,207.....	per set	.12
27814—246.....	each	1.50	34204—234.....	each	.63	37783—231.....	each	.17	38075—206.....	per set	2.10
27898—246.....	per 100	.60	34205—234.....	each	.52	37784—231.....	each	.13	38081—208.....	per set	10.80
28700—215,216.....	each	.28	34206—234.....	each	.41	37785—231.....	each	.71	38082—210.....	per set	2.44
28705—212.....	each	.52	34207—234.....	each	.95	37786—231.....	each	.66	38083—207.....	per set	6.30
28706—212.....	each	.24	34208—234.....	each	.83	37787—231.....	each	.68	38084—207,208.....	per set	3.84
28707—212.....	each	.15	34209—234.....	each	.85	37900—206,207,208.....	each	.11	38088—207.....	per set	.96
28708—212.....	each	.75	34210—234.....	each	1.05	37902—206,208,209, 210.....	each	.22	38091—207.....	per set	2.88
28709—212.....	each	.50	34211—234,238.....	each	.20	*37904—206,207,208,209, 210.....	each		38094—207,208.....	per set	2.64
28710—212.....	each	.38	34212—234,238.....	each	.27				38095—207.....	per set	4.05
28711—212.....	each	.30	34213—234,238.....	each	.23				38096—207.....	per set	3.30
28712—212.....	each	.22	34214—234,238.....	each	.17	37905—206.....	each	.17	38097—207,208.....	per set	1.36
28713—212.....	each	.82	34215—234,238.....	each	.31	37906—206,210.....	each	.27	\$38098—207.....		
28714—212.....	each	.43	34216—234,238.....	each	.31	37911—206,207,208.....	each	.27	38139—249.....	each	.15
28715—212.....	each	.41	34217—234,238.....	each	.33	37912—206,208.....	each	.25	**38402—207.....		
28716—212.....	each	.31	34218—234,238.....	each	.33	37913—206,210.....	each	.33	38404—207.....	per set	5.12
28717—212.....	each	.32	34219—235.....	each	.14	37917—206.....	each	.33	38406—208.....	per set	4.33
28718—212.....	per 100	.20	34220—235.....	each	.32	37918—206.....	each	.30	38407—207.....	per set	3.76
28847—226.....	each	.19	34221—235.....	each	.25	37922—207,209,210.....	each	.28	38409—207.....	per set	2.56
29123—249.....	each	12.75	34222—235.....	each	.19	†37924—207,209,210.....			38422—209.....	per set	3.52
29184—246.....	each	1.25	34223—235.....	each	.46	37926—241.....	each	8.75	38426—208.....	per set	6.60
29187—247.....	each	13.75	34224—235.....	each	.49	37929—207,208.....	each	.16	38429—208.....	per set	6.90
29362—209.....	each	.45	34401—206,210.....	each	.27	37930—207,208.....	each	.17	38430—208.....	per set	2.70
29363—209.....	each	.40	34402—210.....	each	.37	37936—241.....	each	1.10	38431—208.....	per set	.68
29375—231.....	each	.62	34403—235.....	per set	8.42	37939—206,207.....	each	.21	38432—208.....	per set	1.92
29376—231.....	each	.67	34404—234.....	per set	5.56	37940—209.....	each	1.60	38433—208.....	per set	.96
29377—231.....	each	.30	34405—234.....	per set	11.78	37946—207,208,209.....	each	.24	38434—208.....	per set	5.40
29378—231.....	each	.65	34406—234.....	per set	15.68	37947—207,208.....	each	.12	38435—208.....	per set	2.00
29379—231.....	each	.65	34411—209.....	each	.35	37948—252.....	each	2.70	38437—208.....	per set	4.80
29380—231.....	each	.93	35303—212.....	per set	18.65	37949—208,209.....	each	.30	38439—208.....	per set	2.40
29381—231.....	each	.74	35312—246.....	each	4.25	37950—208.....	each	.13	38442—208.....	per set	1.28
29382—231.....	per 100	.25	35339—249.....	each	4.25	37954—209.....	each	.24	38446—209.....	per set	2.72
29383—231,232.....	per 100	.50	35594—246,249.....	each	1.70	37957—252.....	each	1.50	38447—209.....	per set	1.44
29700—249.....	each	2.65	35596—249.....	each	4.75	37959—252.....	per 100	3.50	38449—209.....	per set	2.24
30365—246,249.....	each	2.00	36319—248.....	each	1.25	37961—252.....	each	32.00	38454—209.....	per set	2.64
30493—220.....	per 100	1.80	36536—248.....	each	3.00	37968—209.....	each	.32	†38456—209.....		
32431—247.....	each	7.00	36699—247,248.....	each	3.00	37969—208,209.....	each	.12	38458—209.....	per set	2.10
32557—246.....	each	20.00	36773—206,210.....	each	.24	37971—208.....	each	.25	38459—209.....	per set	5.90
33440—248.....	each	4.85	37579—208.....	each	.30	37973—208,209.....	each	.16	38462—209.....	per set	3.66
33463—217.....	per set	9.38	37646—245.....	each	5.25	37976—209.....	each	.32	38464—209,210.....	per set	3.74
33560—246.....	each	6.50	37683—216.....	each	.35	37989—209.....	each	.17	38471—209.....	per set	1.19
33602—207.....	each	.16	37684—216.....	per set	18.53	38009—210.....	each	.47	38472—209.....	per set	3.30
33624—246,249.....	each	1.70	37713—242.....	each	7.00	38018—206.....	per set	.88	38478—209.....	per set	7.68
33761—241.....	each	6.00	37715—242.....	each	1.00	38019—206.....	per set	.77	38479—209.....	per set	2.66
33762—241.....	each	3.25	37719—227.....	per set	6.72	38021—206.....	per set	1.36	38500.....	per set	4.50
33764—241.....	each	.32	37724—207.....	each	32.00	38022—206.....	per set	1.19	38501—210.....	per set	4.95
33765—241,242.....	each	.18	37726—230.....	each	1.34	38023—206.....	per set	3.42	††38505—210.....		
33766—241.....	each	.25	37727—230.....	each	1.10	38024—206.....	per set	3.93	38506—210.....	per set	5.92
33767—241.....	each	.20	37728—230.....	each	.40	38025—206.....	per set	4.23	38507—210.....	per set	3.60
33789—221.....	each	16	37749—207,208, 209.....	each	.16	38026—206.....	per set	2.72	38508—210.....	per set	5.10
*33802—207.....			37759—231.....	per set	25.08	38027—206.....	per set	2.38	38519—210.....	per set	16.80
33837—217.....	each	.43	37769—227.....	each	.65	38028—206.....	per set	4.77	38520—210.....	per set	8.46
33838—217,218.....	each	.44	37770—227.....	each	.24	38031—208,209.....	per set	4.20	38525—210.....	per set	3.08
33839—217,218.....	each	.35	37771—227.....	each	.26	38032—206.....	per set	7.62	38528—242.....	each	4.00
33840—217,218.....	each	.24	37772—227.....	each	.32	38037.....	per set	3.00	38529—242.....	each	1.45
33841—217,218.....	each	.37	37773—231.....	each	.69	38038—206.....	per set	4.10	38530—242.....	each	.40
33842—217,218.....	each	.18	37774—231.....	each	.68	38039—206,207, 208.....	per set	1.76	38532—228.....	per set	7.20
33843—217,218.....	each	.30	37775—231.....	each	.68	38041—206.....	per set	4.62	38536—232.....	per set	8.24
33844—217,218.....	each	.19	37776—231.....	each	.75	38045—206.....	per set	3.20	38538—232.....	each	.20
33845—217,218.....	each	.27	37777—231.....	each	.76	38046—206.....	per set	5.73	38582—228.....	each	.66
33846—217,218.....	each	.20	37778—231.....	each	.66	38047—206.....	per set	7.11	38583—228.....	each	.60
33939—249.....	each	52.00	37779—231.....	each	.66	38053—208.....	per set	2.42	38584—228.....	each	.48
33941—248.....	each	4.85	37780—231.....	each	.73	38056—210.....	per set	3.96	38591—232.....	each	.38
34161—248.....	each	6.00							38592—232.....	each	.34

* Superseded by Cat. No. 110046.

† Superseded by Cat. No. 110046.

** Superseded by Cat. No. 38037.

† This Cat. No. appears on page 209 by mistake and should be Cat. No. 38459.

‡ Superseded by Cat. No. 38096.

†† This Cat. No. appears on page 210 by mistake and should be Cat. No. 38501.

PRICE SUPPLEMENT TO ACCOMPANY RAILWAY SUPPLY CATALOGUE, No. 4725

CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE
38593-232.....	each	\$0.33	51425-221.....	each	\$0.60	56658-213.....	each	\$0.32	61845-209.....	each	\$0.39
38594-232.....	each	.60	51426-221.....	each	.35	56659-213.....	each	.12	61868-246,247.....	each	14.50
38595-232.....	per 100	.40	51437-245.....	each	5.85	56660-213.....	each	.23	61869-228.....	per set	10.10
38670-246.....	each	20.00	51444-247,249.....	each	14.50	56661-213.....	each	.12	61879-209.....	each	.30
38671-246,247.....	each	14.50	51445-216.....	each	1.20	56662-213.....	each	.32	61880-209.....	each	.24
39444-215.....	per set	6.24	51446-216.....	each	.28	56663-213.....	each	.19	61881-209.....	per set	7.86
39445-215.....	per set	8.07	51447-216.....	each	.68	56664-213.....	each	.25	61897-248.....	each	6.50
39446-215.....	per set	5.87	51448-216.....	each	.62	56665-213.....	each	.36	61903-246.....	each	47.00
39447-217.....	per set	7.06	51449-216.....	each	.88	56666-213.....	each	.45	61906-218.....	per set	9.63
39448-218.....	per set	10.58	51450-216.....	each	.17	56667-213.....	each	.10	61907-218.....	each	.48
39450-211.....	per set	11.20	51451-216.....	each	.45	56668-214.....	each	.22	61908-218.....	each	.35
39466-211.....	per set	11.45	51452-216.....	each	.52	56669-214.....	each	.36	61918-210.....	each	.23
39467-211.....	per set	15.15	51453-216.....	each	.39	56670-214.....	each	.43	61919-210.....	per set	3.68
39468-212.....	per set	11.83	51454-216.....	each	.61	56671-214.....	each	.25	62353-239.....	each	.33
39469-212.....	per set	12.16	51455-216.....	each	.73	56672-214.....	each	.29	62354-239.....	each	.16
39470-212.....	per set	17.71	51456-216.....	each	.37	56673-214.....	each	.13	62550-247.....	price on app.	
39471-213.....	per set	9.55	51457-216.....	each	.44	56674-214.....	each	.15	64047-247.....	price on app.	
39472-213.....	per set	4.47	51458-216.....	each	.32	56675-214.....	each	.33	64049-219.....	each	.72
39474-213.....	per set	11.19	51459-245,246,247, 249.....	each	5.85	56676-214.....	each	.36	64050-219.....	each	.81
39475-214.....	per set	8.58	51492-206.....	each	.42	56677-214.....	each	.14	64051-219.....	each	.24
39476-214.....	per set	19.31	51529-248.....	each	4.75	56678-214.....	each	.38	64052-219.....	each	.18
39478-222.....	per set	14.67	51530-249.....	each	4.00	56679-214.....	each	.93	64053-219.....	each	1.50
39479-222.....	per set	30.40	51539-211.....	each	.30	56680-214.....	each	.78	64054-219.....	each	.77
39480-223.....	per set	4.08	51540-211.....	each	.33	56681-214.....	each	.23	64055-219.....	each	.29
39481-223.....	per set	11.77	51545-240.....	each	.25	56682-214.....	each	.50	64056-219.....	each	.50
39482-224.....	per set	3.91	51582-240.....	each	2.80	56683-214.....	each	.63	64057-219.....	each	.64
39483-224.....	per set	15.44	51602-240.....	each	10.50	56684-214.....	each	.17	64058-219.....	each	1.15
39484-225.....	per set	14.92	51603-240.....	each	2.00	56685-214.....	each	.23	64059-219.....	each	.90
39485-225.....	per set	9.29	51604-240.....	each	1.00	56686-214.....	each	.19	64060-219.....	each	.09
39486-226.....	per set	5.55	51605-240.....	each	.35	56687-214.....	each	.09	64061-219.....	each	.15
39488-226.....	per set	5.84	51631-240.....	each	.85	56688-214.....	each	.45	64062-219.....	per set	14.98
39489-231.....	per set	11.76	51733-240.....	each	18.50	56689-213.....	each	.66	64065-219,220.....	each	.20
40463-243.....	each	.40	51734-240.....	each	2.00	56690-213.....	each	.36	64066-219,220.....	each	.35
40484-226,227, 239.....	per 100	3.00	51735-240.....	each	1.00	56691-213.....	each	.40	64067-220.....	each	.46
40982-227.....	per set	4.66	51736-240.....	each	.90	56692-213.....	each	.46	64068-219,220.....	each	.45
41002-242.....	each	.25	51737-240,241.....	each	.25	56693-213.....	each	.37	64069-219,220.....	each	.15
41018-227.....	per set	3.04	51738-240.....	each	1.00	56694-214.....	each	.81	64070-219,220.....	each	.50
41024-227.....	each	.25	51740-240.....	each	5.00	56695-213.....	each	.30	64071-220.....	each	.56
41025-227.....	each	.35	51741-240.....	each	1.25	56696-213.....	each	.30	64072-219,220.....	each	.32
41026-227.....	each	.18	51742-240.....	each	.85	56722-242.....	each	7.00	64073-219,220.....	each	.30
41027-227.....	each	.34	56518-246.....	each	14.50	56723-242.....	each	1.50	64074-220.....	each	.50
41028-227.....	each	.40	56520-247.....	each	6.00	56724-242.....	each	.75	64075-220.....	each	.37
41029-227.....	each	.38	56535-240.....	each	10.50	56752-247,248.....	each	4.75	64076-219,220,228, 229.....	each	.06
41030-227.....	each	.34	56536-240.....	each	6.25	56756-241,242.....	each	.25	64077-220.....	per set	9.88
41031-227.....	each	.40	56537-240.....	each	1.75	56766-209.....	each	.16	64078-220.....	each	.20
41032-227.....	per 100	3.00	56538-240.....	each	1.75	56771-231,232.....	each	1.50	64079-220.....	each	.45
41033-215,216,219,220, 227,228,234,238, 239.....	per 100	.50	56539-240.....	each	.50	56772-231.....	each	.30	64080-220.....	each	.38
41034-227.....	each	.32	56540-240.....	each	.50	56779-246.....	each	12.50	64081-220.....	each	.24
41035-227.....	each	.27	56541-240.....	each	.75	56793-241.....	each	2.00	64082-220.....	each	.35
41036-227.....	each	.30	56542-240.....	each	.30	56794-241.....	each	.60	64083-220.....	each	.39
43228-209.....	per set	1.08	56575-214.....	each	.35	56795-241.....	each	.28	64084-220.....	each	.44
46554-207.....	each	.30	56576-214.....	each	.45	56856-242.....	each	3.75	64085-220.....	per set	6.62
46556-207.....	each	.13	56642-211,213.....	each	.22	56857-242.....	each	1.10	64430-224.....	per set	15.79
46557-207.....	per set	4.31	56643-211,213.....	each	.22	56858-242.....	each	.20	65952-249.....	each	.25
46558.....	per set	4.80	56644-212.....	each	.27	56870-242.....	each	.30	66071-228.....	each	2.50
49071-242.....	each	2.50	56645-212.....	each	1.20	56890-242.....	each	4.00	66717-219.....	each	.44
49072-242.....	each	.08	56646-212.....	each	.19	58416-249.....	each	10.50	66718-219.....	each	.54
49077-228.....	per set	4.40	56647-212.....	each	.50	59373-226.....	per 100	2.00	66719-219.....	each	.35
49092-226.....	each	.30	56648-212.....	each	.37	60332-246.....	each	31.50	66720-219.....	each	.23
49093-226.....	each	.30	56649-212.....	each	.32	60446-239.....	per set	3.51	66721-219.....	each	.50
49094-226.....	each	.25	56650-212.....	each	.39	60564-246.....	each	19.50	66899-221.....	each	.22
49326-228.....	each	.56	56651-212.....	each	.25	60916-247.....	each	.80	66900-221.....	each	.62
49327-228.....	each	.48	56652-212.....	each	.22	60917-248.....	each	9.75	66901-221.....	each	.13
49328-228.....	each	1.68	56653-212.....	each	.37	60992-232.....	per 100	.20	66902-221.....	each	.16
49329-228.....	per 100	55.00	56654-212.....	each	.58	61414-228.....	each	2.50	66903-221.....	each	.45
49356-228.....	per set	12.08	56655-212.....	each	.18	61415-228.....	each	.70	66904-221.....	each	.35
			56656-212.....	each	.18	61416-228.....	each	.59	66905-221.....	each	.56
			56657-212.....	each	.51	61419-228.....	each	.45	66906-219.....	per set	9.47
						61844-209.....	each	.46			

PRICE SUPPLEMENT TO ACCOMPANY RAILWAY SUPPLY CATALOGUE, No. 4725

CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE	CAT. NO.	PAGE	LIST PRICE
67451—207.....	each	\$0.32	105681—229.....	each	\$0.52	108026—233.....	each	\$0.25	110513—242.....	each	\$4.50
67459—208.....	each	.30	105682—229.....	each	.61	108027—233.....	each	.26	110514—242.....	each	2.60
67460—208.....	each	.16	105683—229.....	per set	12.41	108028—233.....	each	.23	110515—242.....	each	2.60
67461—.....	per set	3.74	105684—229.....	per set	13.55	108029—233.....	each	.73	110516—242.....	each	26.05
*67462—207.....			105685—229.....	each	.58	108030—233.....	each	.91	110517—242.....	each	2.50
67470—208.....	per set	3.20	105686—229.....	each	.23	108031—233.....	per set	15.98	110518—242.....	each	1.35
67471—208.....	per set	2.56	105687—229.....	each	.43	108466—208.....	per set	2.00	110519—242.....	each	.95
67472—208.....	per set	1.28	105688—229.....	each	.31	110035—243.....	each	2.85	110520—242.....	each	1.25
68160—203.....	each	11.00	105689—229.....	per set	11.82	110036—243.....	each	.25	110521—242.....	each	25.90
68976—249.....	each	15.50	105690—229.....	per set	12.56	110046—207.....	each	.30	110522—242.....	each	2.90
68987—209.....	per set	4.14	105693—239.....	each	1.50	**110047—207.....			110523—242.....	each	1.60
68988—209.....	per set	7.02	105694—239.....	each	1.85	A110049—207.....			110524—242.....	each	1.15
68989—209.....	per set	6.63	105695—239.....	each	.26	§110050—207.....			110525—242.....	each	27.70
69033—210.....	per set	3.24	105696—239.....	each	.25	B110051—207.....			110526—242.....	each	3.05
†69034—210.....			105697—239.....	each	.55	C110052—207.....			110527—242.....	each	1.70
69037—210.....	per set	3.78	105698—239.....	each	.46	110054—243.....	each	3.15	110528—242.....	each	1.25
69038—210.....	per set	7.84	105699—239.....	per set	22.14	110055—243.....	each	.30	110529—242.....	each	12.15
69043—210.....	per set	16.24	†105700—239.....	per set	21.02	110056—243.....	each	7.95	110530—242.....	each	7.75
69044—210.....	per set	15.12	105701—239.....	each	.34	110057—243.....	each	2.45	110531—242.....	each	13.75
88458—235.....	each	.60	†105702—239.....	each	20.48	110058—243.....	each	1.50	110532—242.....	each	.25
88467—235.....	each	.88	107677—229.....	per set	12.56	110059—243.....	each	.20	110533—243.....	each	.40
88469—235.....	each	1.17	107723—207.....	each	.80	110060—243.....	each	.08	110534—243.....	each	.60
88470—235.....	each	1.15	107726—207.....	each	.30	110061—243.....	each	8.05	110535—243.....	each	.70
88471—235.....	each	1.35	107727—207.....	per set	11.20	110062—243.....	each	.40	110536—243.....	each	.80
88472—235.....	each	1.65	107728—207.....	per set	1.60	110063—243.....	each	.40	110537—243.....	each	.65
88473—235.....	per set	9.35	107968—232.....	each	.55	110064—243.....	each	7.30	110538—243.....	each	1.25
88488—236.....	each	1.87	107969—232.....	each	.26	110065—243.....	each	1.90	110539—243.....	each	1.55
88489—236.....	each	2.08	107970—232.....	each	.27	110066—243.....	each	.45	110540—243.....	each	.45
88490—236.....	each	1.68	107971—232.....	each	.28	110067—243.....	each	.08	110541—243.....	each	.45
88491—236.....	each	1.50	107972—232.....	each	.84	110068—243.....	each	4.95	110542—243.....	each	5.65
88492—236.....	each	1.26	107973—232.....	each	.77	110069—243.....	each	.25	110543—243.....	each	.15
88493—236.....	each	1.56	107974—232.....	each	.70	110070—241.....	each	11.00	110544—243.....	each	.25
88494—236.....	per set	16.27	107975—237.....	each	1.82	110071—241.....	each	1.00	111077—208.....	each	.70
88495—236.....	each	.55	107976—237.....	each	.81	110072—241.....	each	1.00	111078—208.....	each	.60
88496—236.....	each	.70	107977—237.....	each	.89	110073—241.....	each	48.00	111081—208.....	per set	17.10
88497—236.....	each	.66	107978—237.....	each	.74	110074—241.....	each	5.35	111082—208.....	per set	10.50
88498—236.....	each	.53	107979—237.....	per set	16.98	110075—241.....	each	4.55	111083—208.....	per set	7.70
88499—236.....	each	.86	107980—226.....	each	.65	110076—241.....	each	.95	111548—209.....	each	.70
88623—236.....	per set	22.87	107981—226.....	each	.25	110077—241.....	each	1.35	111549—209.....	per set	9.80
88624—237.....	each	1.90	107982—226.....	each	.60	110078—241.....	each	38.00	111550—209.....	per set	16.80
88625—237.....	each	1.37	107983—226.....	per set	4.06	110079—241.....	each	6.50	111551—209.....	per set	18.20
88626—237.....	per set	27.22	107984—226.....	each	.05	110080—241.....	each	.80	111553—226.....	per set	4.10
88627—238.....	per set	6.87	107985—227.....	each	.45	110081—241.....	each	1.85	111562—215.....	each	.52
88628—238.....	each	.85	107986—227.....	each	.55	110082—241.....	each	.90	111563—215.....	each	.23
88639—238.....	each	.81	107987—227.....	each	.55	110083—241.....	each	.90	111564—215.....	each	.50
88640—238.....	per set	13.86	107988—227.....	each	.65	110084—241.....	each	1.50	111565—215.....	per set	8.01
88982—238.....	per 100	.80	107989—227.....	each	.28	110085—241.....	each	1.40	111711—221.....	each	.82
89585—227,229.....	per 1000	4.25	107990—227.....	each	.26	110086—241.....	each	28.50	111712—221.....	each	.55
89590—247.....	each	2.00	107991—227.....	each	.25	110087—241.....	each	2.30	111719—216.....	each	.44
89594—246.....	each	13.00	107992—227.....	per set	11.75	110088—241.....	each	1.75	111720—216.....	each	.20
103172—207.....	each	.20	108009—232.....	per set	8.41	110089—241.....	each	49.90	111721—216.....	per set	5.87
103185—207.....	each	.08	108010—232,233.....	per 1000	2.75	110090—241.....	each	2.75	111728—220.....	each	.10
103196—206,207.....	per set	3.20	108011—233.....	each	.77	110091—241.....	each	2.10	111729—220.....	each	.11
103205—207.....	per set	2.60	108012—233.....	each	.39	110092—241.....	each	1.75	111730—220.....	each	.28
103206—207.....	per set	2.52	108013—233.....	each	.88	110093—241.....	each	1.55	111731—220.....	each	.32
103208—207.....	per set	4.20	108014—233.....	each	.78	110094—241.....	each	1.85	111732—220.....	each	.33
103210—207.....	per set	.48	108015—233.....	each	.70	110095—242.....	each	.25	111733—220.....	each	.36
103211—207.....	per set	.09	108016—233.....	per set	11.00	110096—242.....	each	6.25	111734—220.....	each	.23
103213—207.....	per set	3.60	108017—233.....	each	.62	110097—242.....	each	2.20	111735—220.....	per set	4.25
103214—207.....	per set	.24	108018—233.....	each	.39	110098—242.....	each	1.05	111738—232.....	each	.42
105640—276.....	per 1000	11.50	108019—233.....	each	.40	110099—242.....	each	5.25	111739—232.....	each	.47
105676—228,229.....	each	.43	108020—233.....	each	.38	110507—242.....	each	1.10	111740—232.....	each	.55
105677—228,229.....	each	.44	108021—233.....	each	.80	110508—242.....	each	.70	111741—232.....	each	.80
105678—228.....	each	.14	108022—233.....	each	.73	110509—242.....	each	.30	111742—232.....	each	.42
105679—228.....	each	.35	108023—233.....	each	.90	110510—242.....	each	7.45	111743—232.....	each	.33
105680—228.....	per set	7.13	108024—233.....	per set	15.66	110511—242.....	each	3.45	111744—232.....	each	.10
			108025—233.....	each	.49	110512—242.....	each	4.50	111745—232.....	per set	10.48

* Superseded by Cat. No. 67461.

† The titles for the two line cuts at the bottom of page 239 should be transposed.

A Superseded by Cat. No. 38083.

† Superseded by Cat. No. 38500.

B Superseded by Cat. No. 38031.

** Superseded by Cat. No. 38096.

§ Superseded by Cat. No. 67463.

c Superseded by Cat. No. 46558.

ARC DEFLECTORS AND PARTS

TYPE C CONTROLLERS

Controller	CAT. NO.				
	Arc Deflector Complete	Division Plate	Back Plate	Insulating Bushing for Screw Fastening Deflector to Pole Piece	Misc.
C-6A & C-6K	22773	22776	22775	19630	
C-26A	110035	40463	110036		
C-28C & C-28D	22773	22776	22775	19630	
C-35A	110035	40463	110036		
C-36C	110035	40463	110036		
C-38A, C-38B } C-38C & C-38D }	22773	22776	22775	19630	
C-71C	110054	40463	110055		
C-73B	110056	110059		110060	{ † 110057 ‡ 110058
C-74A	110061	110063	110062		
C-79A	110064	110066	110065	110067	
C-80A	110068	40463	110069		

† Wide strip.

‡ Narrow strip.

TYPE T CONTROLLERS

Controller	CAT. NO.			Controller	CAT. NO.		
	Arc Deflector Complete	Division Plate	Back Plate		Arc Deflector Complete	Division Plate	Back Plate
T-1A		110533		T-34A		110541	
T-1G		110533		T-34E		110541	
T-1H		110533		T-36A		110536	
T-10A		110534		T-40A	110542	110544	110543
T-10J		110534		T-42A		110536	
T-26A		110535		T-42C		110536	
T-28A		110536		T-42D		110536	
T-29A		110536					
T-33A {		*110537					
		†110538					
		‡110539					
		§110540					

* Upper end.

† Lower end.

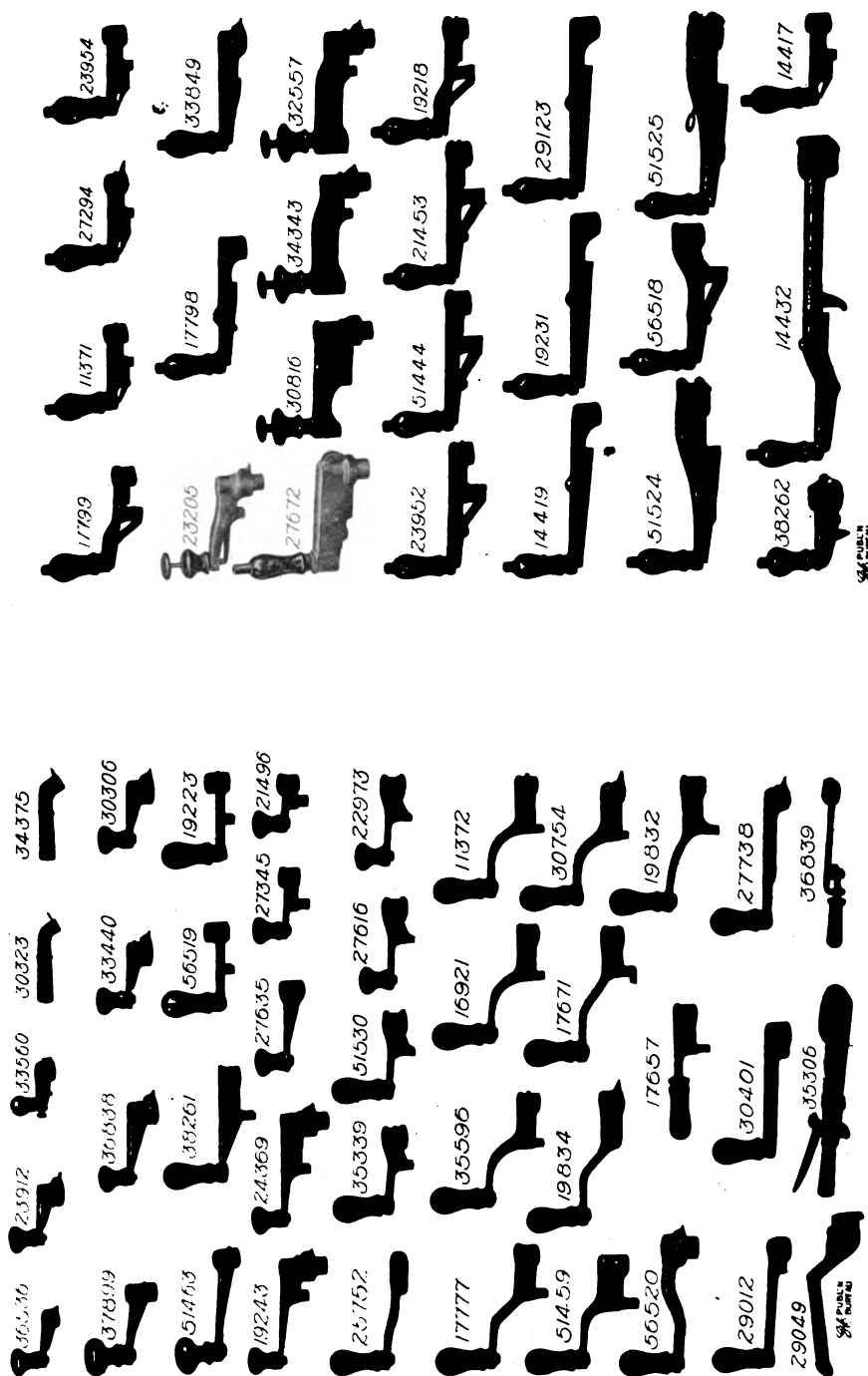
‡ Intermediate with bushings.

§ Intermediate without bushings.

CONTROLLER HANDLES

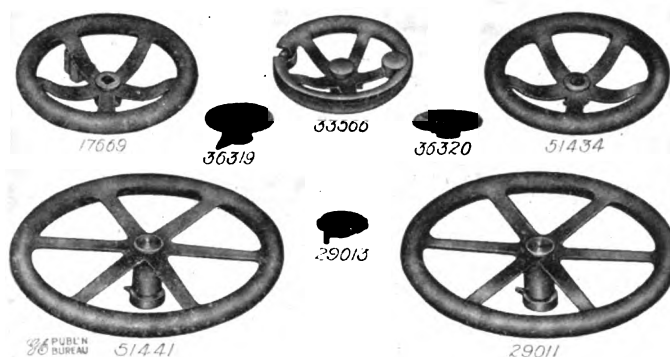
General Electric Controller Handles are made from a special brass alloy or malleable iron steel forgings—depending on conditions of operation.

Each handle has its catalogue number stamped or cast on it, to assist customers in ordering.

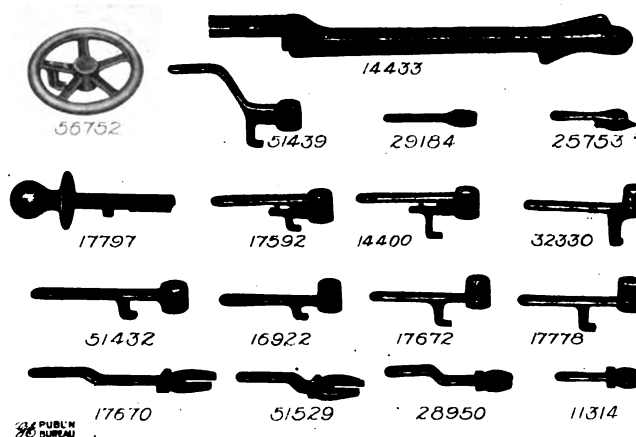


REPRESENTATIVE TYPES OF CONTROLLER OPERATING HANDLES

CONTROLLER HANDLES



Representative Types of Controller Operating Wheels



Representative Types of Controller Reversing Handles

TYPE B CONTROLLERS

Controller	OPERATING HANDLES		REVERSING HANDLES		Controller	OPERATING HANDLES		REVERSING HANDLES	
	Cat. No.	Material	Cat. No.	Material		Cat. No.	Material	Cat. No.	Material
B-3A	17777	Brass	*17778	Brass	B- 8C	19832	Brass	17672	Brass
B-3B	17777	Brass	*17778	Brass		†19833	Brass	17672	Brass
B-3G	51437	Brass	*17778	Brass		†17657	Brass	17672	Brass
B-4A	17777	Brass	*17778	Brass	B-13A	17777	Brass	*17778	Brass
B-5A	17777	Brass	*17778	Brass	B-13B	17777	Brass	*17778	Brass
B-6A	17777	Brass	*17778	Brass	B-13C	Δ14431	Brass	*17778	Brass
	Δ14431	Brass	*17778	Brass	B-18A	17777	Brass	*17778	Brass
B-8A	17777	Brass	17672	Brass	B-19A	*51459	Brass	*17778	Brass
	†17657	Brass	17672	Brass		†17657	Brass	*17778	Brass
B-8B	17777	Brass	17672	Brass	B-23A	17777	Brass	*17778	Brass
	†17657	Brass	17672	Brass	B-24A	Δ37646	Brass	*17778	Brass
						17777	Brass	*17778	Brass

Δ Special.

† Special series handle.

‡ Brake handle.

* Similar handles of malleable iron are shown on page 249.

CONTROLLER HANDLES

TYPE C CONTROLLERS

Controller	OPERATING HANDLES		REVERSING HANDLES	
	Cat. No.	Material	Cat. No.	Material
C- 6A	32557	Brass	11314	Brass
	△26791	Brass	△27814	Brass
C- 6K	34343	Brass	11314	Brass
C-26A	33560	Mal. Iron	△27814	Brass
C-28C	34343	Brass	None	
C-28D	34343	Brass	29184	Steel, D.F.
C-35A	38670	Brass	29184	Steel, D.F.
C-36C	33560	Mal. Iron	None	
C-38A	34343	Brass	29184	Steel, D.F.
C-38B	34343	Brass	29184	Steel, D.F.
C-38C	34343	Brass	29184	Steel, D.F.
C-38D	34343	Brass	29184	Steel, D.F.
C-71C	60564	Brass	29184	Steel, D.F.
C-73B	60332	Brass	29184	Steel, D.F.C.
C-74A	60564	Brass	29184	Steel, D.F.
C-79A	61903	Brass	29184	Steel, D.F.
C-80A	89594	Brass	None	

TYPE K CONTROLLERS

K- 2A	*16921	Brass	*16922	Brass
	*51459	Brass	°‡35594	Mal. iron
K- 6A	°34400	Mal. Iron	*17778	Brass
	△11299	Brass	*17778	Brass
K- 6B	‡23911	Brass	*17778	Brass
	56518	Brass	None	
K- 6G	*51459	Brass	*17778	Brass
K- 6H	*51459	Brass	*17778	Brass
K- 8A	*16921	Brass	*17778	Brass
K- 9A	*16921	Brass	*17778	Brass
	*16921	Brass	*17778	Brass
K-10A	°30365	Mal. Iron		
	*56779	Brass	°‡33624	Mal. Iron
	△35312	Brass	*17778	Brass
	△14430	Brass	*17778	Brass
K-10D	*16921	Brass	x14400	Brass
K-10F	*16921	Brass	*17778	Brass
K-11A	*16921	Brass	*17778	Brass
K-11C	*16921	Brass	x14400	Brass
K-11H	*16921	Brass	*17778	Brass
K-12A	*16921	Brass	*17778	Brass
K-13A	38671	Mal. Iron	17670	Brass
K-13E	38671	Mal. Iron	17670	Brass
K-14A	z61868	Mal. Iron	17670	Brass
	s38671	Mal. Iron	17670	Brass
K-14B	z61868	Mal. Iron	17670	Brass
	s38671	Mal. Iron	17670	Brass
K-14E	z61868	Mal. Iron	17670	Brass
	s38671	Mal. Iron	17670	Brass
K-27A	*16921	Brass	*17778	Brass
K-27C	*16921	Brass	*17778	Brass

° Special malleable iron handle.

△ Special.

‡ Special handwheel.

‡ Includes brass bushing Cat. No. 38139 and galv. iron cap Cat. No. 38140.

† Special handle with flat knob.

* Similar handles of malleable iron are shown on page 249.

s For 1½ in. shaft extension.

z For 2 in. shaft extension.

x Emergency reversing handle.

CONTROLLER HANDLES

TYPES K AND L CONTROLLERS

Controller	OPERATING HANDLES		REVERSING HANDLES	
	Cat. No.	Material	Cat. No.	Material
K-28A	*51459	Brass	*17778	Brass
K-28E	Δ32431	Brass	*17778	Brass
	*51459	Brass	*17778	Brass
K-28F	Δ32431	Brass	*17778	Brass
	*51459	Brass	*17778	Brass
K-28J	*51459	Brass	*17778	Brass
K-28K	*51459	Brass	*17778	Brass
	Δ32431	Brass	*17778	Brass
K-28N	89590	Mal. Iron	*17778	Brass
K-29A	*51459	Brass	*17778	Brass
K-34B	61868	Mal. Iron	60916	Steel, D.F.
K-34C	61868	Mal. Iron	60916	Steel, D.F.
	s62550	Mal. Iron		
K-34D	61868	Mal. Iron	60916	Steel, D.G.
	s62550	Mal. Iron		
K-35B	*51459	Brass	60916	Steel, D.F.
K-35C	*51459	Brass	60916	Steel, D.F.
K-35D	*51459	Brass	60916	Steel, D.F.
K-35E	*51459	Brass	60916	Steel, D.F.
	s64047	Mal. Iron		
K-36A	*51459	Brass	60916	Steel, D.F.
K-36B	*51459	Brass	60916	Steel, D.F.
	s64047	Mal. Iron		
K-37A	*51459	Brass	60916	Steel, D.F.
L- 4A	17798	Brass	17797	Mal. Iron

TYPE R CONTROLLERS

R- 6A	38671	Mal. Iron	17670	Brass
R- 6B	56520	Mal. Iron	None	
R- 9A	51444	Brass	None	
R-11A	*16921	Brass	*16922	Brass
R-11B	*16921	Brass	*16922	Brass
R-12A	*16921	Brass	*16922	Brass
R-13A	17799	Brass	None	
R-14A	*16921	Brass	*16922	Brass
R-14C	*16921	Brass	*16922	Brass
R-15A	*16921	Brass	*16922	Brass
R-16A	*16921	Brass	*16922	Brass
R-17A	*16921	Brass	*16922	Brass
R-19A	*16921	Brass	*16922	Brass
R-21A	17799	Brass	None	
R-22A	*16921	Brass	*16922	Brass
R-22C	*16921	Brass	*16922	Brass
R-27A	17799	Brass	None	
	π11478	Brass	None	
R-27D	17799	Brass	None	
R-27M	17799	Brass	None	
	14417	Brass	None	
R-28A	x29187	Brass	None	
	π11479	Brass	None	
†R-28F	None		None	
R-28G	14417	Brass	None	
R-28N	†11371	Brass	None	
R-28V	14417	Brass	None	
R-29A	*16921	Brass	*16922	Brass
R-32A	17799	Brass	None	
R-32B	17799	Brass	None	
R-37A	*16921	Brass	x56752	Brass
			36699	Brass
R-37B	*16921	Brass	x56752	Brass
R-37F	*16921	Brass	x56752	Brass
R-38A	*16921	Brass	x56752	Brass

Δ Special.

* Similar handles of malleable iron are shown on page 249.

† Marine handle.

x Handwheel.

π Operating wheel, rope drive.

† No handle furnished.

s Time limit control handle.

o Special handwheel.

CONTROLLER HANDLES

TYPE R CONTROLLERS

Controller	OPERATING HANDLES		REVERSING HANDLES	
	Cat. No.	Material	Cat. No.	Material
R- 53A	23912	Mal. Iron	None	
	π61897	Mal. Iron		
R- 53B	Δ33440	Brass	None	
R- 53C	Δ33440	Brass	None	
R- 56A	23912	Mal. Iron	None	
R- 60A	*16921	Brass	32330	Brass
R- 60C	*16921	Brass	32330	Brass
R- 65A	34161	Mal. Iron	None	
R- 75A	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75A2	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75A5	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75B	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75C5	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75E2	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 75H	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 76A	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 76A2	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 76A5	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 76B2	36536	Mal. Iron	None	
	x36319	Cast Iron	None	
R- 77A	*16921	Brass	32330	Brass
R- 84A	17799	Brass	None	
R- 84C	17799	Brass	None	
R- 86A	*16921	Brass	36699	Brass
			x56752	Brass
R- 86B	*16921	Brass	36699	Brass
			x56752	Brass
R- 86D	*16921	Brass	36699	Brass
			x56752	Brass
R- 86E	*16921	Brass	36699	Brass
			x56752	Brass
R- 86F	*16921	Brass	36699	Brass
			x56752	Brass
R- 98A	17799	Brass	None	
R- 99A	33941	Mal. Iron	None	
R-109A	60917	Mal. Iron	51529	Brass
R-112A	60917	Mal. Iron	51529	Brass
R-113A	60917	Mal. Iron	51529	Brass
R-114A	60917	Mal. Iron	51529	Brass
R-121A	17799	Brass	None	
R-121B	17799	Brass	None	
R-121C	17799	Brass	None	

Δ Marine handle.

π Operating wheel, rope drive.

x Handwheel.

* Similar handles of malleable iron are shown on page 249.

CONTROLLER HANDLES

TYPE T CONTROLLERS

Controller	OPERATING HANDLES		REVERSING HANDLES	
	Cat. No.	Material	Cat. No.	Material
T- 1A	14417	Brass	None	
	*11479	Brass	None	
	Δ22976	Brass	None	
T- 1G	14417	Brass	None	
	*11479	Brass	None	
T- 1H	14417	Brass	None	
T- 7A	*11479	Brass	None	
	51444	Brass	None	
T-10A	17799	Brass	None	
	†22975	Brass	None	
	x33939	Brass	None	
T-10J	17799	Brass	None	
T-11A	35596	Brass	None	
T-20A	35339	Brass	None	
T-20B	51530	Brass	None	
T-20C	x68976	Brass	None	
T-26A	17799	Brass	None	
T-28A	29123	Mal. Iron	None	
T-29A	58416	Mal. Iron	None	
T-33A	*51459	Brass	*17778	Brass
T-34A	14417	Brass	None	
T-34E	14417	Brass	None	
T-36A	29123	Mal. Iron	None	
T-40A	29700	Mal. Iron	None	
T-42A	29123	Mal. Iron	None	
T-42C	29123	Mal. Iron	None	
T-42D	29123	Mal. Iron	None	

† Special handle with extension shaft socket.

Δ Special.

x Handwheel.

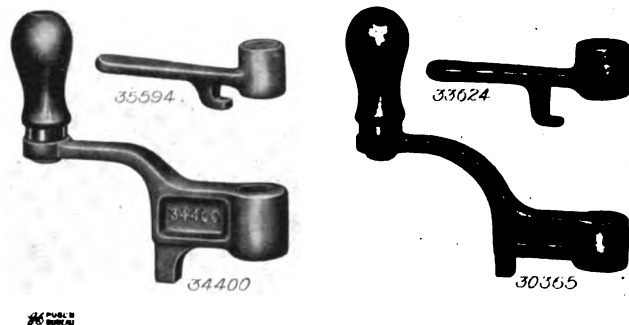
* Operating wheel, rope drive.

* Similar handles of malleable iron are shown below.

MALLEABLE IRON

Special Malleable Iron Controller Handles are furnished to meet the demand for handles less expensive and less liable to loss by theft than the corresponding standard brass handles with which they are interchangeable.

For protection of the iron from rust these handles are galvanized by a process which will withstand the Standard Marine Acid Test. They are provided with renewable brass bushings which prevent wear of the controller shaft.



Representative Types of Special Malleable Iron Controller Handles

OPERATING

REVERSING

Malleable Iron Handle Cat. No.	Interchangeable With Brass Handle Cat. No.	Malleable Iron Handle Cat. No.	Interchangeable With Brass Handle Cat. No.
30365	16921	35594	16922
34400	51459	33624	17778

BRASS BUSHINGS FOR MALLEABLE IRON CONTROLLER HANDLES

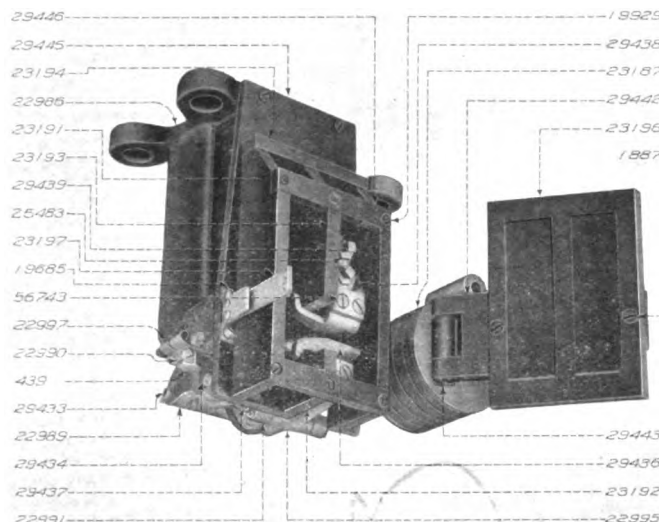
*Brass Bushing Cat. No.	For use with Mall. Iron Controller Handle Cat. No.
65952	30365
65953	34400
38139	35594
38139	33624

The above brass bushings prevent wear on the controller shaft. They are easily renewable and are placed in the controller handles with a pressing fit.

* Includes two halves.

CONTACTORS AND INTERLOCKS

Used Principally with Sprague-General Electric Type M Control Apparatus



TYPE DB15, FORMS A AND E CONTACTORS

Cat. No.

Description

30426	OPERATING MAGNET SPOOL, complete, DB15-A-6
30427	Operating magnet spool, complete, DB15-A-7
34268	Operating magnet spool, complete, DB15-A-8
40127	Operating magnet spool, complete, DB15-A-9
40173	Operating magnet spool, complete, DB15-A-10
40174	Operating magnet spool, complete, DB15-A-11
40175	Operating magnet spool, complete, DB15-A-12
40176	Operating magnet spool, complete, DB15-A-13
40177	Operating magnet spool, complete, DB15-A-14
40178	Operating magnet spool, complete, DB15-A-15
40196	Operating magnet spool, complete, DB15-A-16
47547	Operating magnet spool, complete, DB15-A-18
47548	Operating magnet spool, complete, DB15-A-19
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22986	MAGNET FRAME
22987	Screw pole for magnet spool
22988	Spring washer for pole ($1\frac{1}{2}$ "x $3\frac{1}{4}$ " Ph. Brz.)
22989	* Bearing bracket for DB15-A Contactor only
439	Cap screw fastening bearing bracket to frame ($\frac{1}{2}$ "-13, 1" Hex. H.)
22990	Washer plate for No. 439
22991	Contact lever
29433	Hinge pin for lever and bracket ($\frac{1}{8}$ "x $4\frac{3}{8}$ " Tob. Brz.)
4030	Spring cotter for No. 29433 ($\frac{3}{32}$ "x $\frac{1}{8}$ ")
22993	Plunger for lever
29434	Pin for plunger ($\frac{1}{2}$ "x $4\frac{1}{8}$ ")
29435	Spring cotter for No. 29434 ($\frac{3}{32}$ "x $1\frac{1}{8}$ ")
22995	Contact finger, complete, includes contact tip, terminal and pigtail
29436	Contact tip
56743	Screw fastening contact tip to finger (14-24, $\frac{1}{4}$ " F.H.)
22997	Terminal with pigtail
29437	* Hinge pin for finger and lever ($\frac{1}{8}$ "x $3\frac{1}{8}$ " Tob. Brz.) for DB15-A Contactor only
4030	Spring cotter for No. 29437 ($\frac{3}{32}$ "x $\frac{1}{8}$ ")
29438	Fixed contact base, complete, with contact tip No. 29436, set screw and binding nuts
56743	Screw fastening contact tip to base (14-24, $\frac{1}{4}$ " F.H.)

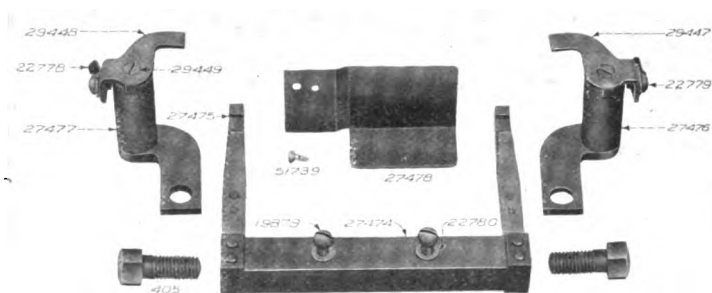
* For the DB15-E Contactor, bracket Cat. No. 22989 is replaced by bracket Cat. No. 46779 which is an integral part of the interlock (see page 277), and hinge pin Cat. No. 29437 is replaced by the interlock operating lever pin Cat. No. 46801 (see page 278).

CONTACTORS AND INTERLOCKS

TYPE DB15, FORMS A AND E CONTACTORS—(Concluded)

Cat. No.	Description
29439	Set screw for base ($\frac{1}{16}$ "-18, $1\frac{1}{8}$ " Sq. H. Oval Point Sp'l)
25483	Binding nut for set screw ($\frac{1}{16}$ "-18, Hex., Blued Sp'l)
2028	Screw fastening contact base in position (14-24, $\frac{1}{8}$ " F.H.)
29441	Pressure spring for contact finger (Black Steel Wire, $\frac{1}{16}$ " Outside Diam., Open)
23177	Fiber button for spring
23187	Blow-out spool, wound, complete, with terminal
10104	Cap screw fastening No. 23187 to frame ($\frac{3}{4}$ "-10, 4" Hex. H.)
29442	Pole piece with paper packing
29443	Hinge pin for pole piece ($\frac{1}{2}$ "x $3\frac{1}{4}$ "
5006	Spring cotter for No. 29443 ($\frac{1}{2}$ "x $\frac{1}{2}$ "
1887	Screw fastening pole piece to door for arc chute (14-24, $\frac{1}{8}$ " F.H.)
29444	Bushing used with No. 1887 (Tapped 14-24 thread Fiber Sp'l)
23189	ARC CHUTE, complete. includes shield for magnet spool, door, door catch and screws for fastening in position
19685	Screw fastening chute and door catch in position (14-24, $\frac{1}{8}$ " R.H. Blued)
29445	Back for chute
23191	Side partition
23192	Middle partition, lower end
23193	Middle partition, upper end
23194	Upper end partition
29446	Partition brace
27884	Shield for magnet spool
23196	Door for arc chute
23197	Catch, complete, for door
19929	Screw fastening parts of partition together (No. 8, $\frac{1}{8}$ " F.H.)

TYPE DB15, FORM B CONTACTOR



The following are additional parts used with the DB15-B Contactor, which when added to a DB15-A convert it into a DB15-B Contactor, all other parts being identical:

27474	Interlocking contact finger strap, complete, with fingers and screws for fastening to contact lever
27475	Contact finger, complete, with tip and rivet
27476	Interlocking contact post, complete, with all attached parts (right-hand)
27477	Interlocking contact post, complete, with all attached parts (left-hand)
29447	Interlocking contact (right-hand)
29448	Interlocking contact (left-hand)
29449	Screw fastening Nos. 29447, 29448 to post (10-24, $\frac{1}{8}$ " F.H. Brass)
405	Cap screw fastening contact posts to frame ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H.)
19879	Screw fastening finger strap to brackets (14-24, $\frac{1}{8}$ " R.H. Blued)
22779	Binding screw for contact post (14-24, $\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for Nos. 19879, 22779 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for binding post
27478	Shield for interlocking contact post and blow-out spool
51739	Screw fastening shield to back of chute (No. 8, $\frac{1}{8}$ " R.H. Blued)

CONTACTORS AND INTERLOCKS**TYPE DB15, FORM C CONTACTOR**

Cat. No.	Description
	<i>The following are additional parts used with the DB15-C Contactor, which when added to a DB15-A, convert it into a DB15-C Contactor, all other parts being identical:</i>
27474	Interlocking contact finger strap, complete, with fingers and screws for fastening to contact lever
27475	Contact finger, complete, with tip and rivet
37948	Interlocking contact post, complete, with all attached parts (right-hand)
37951	Interlocking contact post, complete, with all attached parts (left-hand)
37952	Interlocking contact (right-hand)
37957	Interlocking contact (left-hand)
29449	Screw fastening Nos. 37952, 37957 to post (10-24, $\frac{3}{8}$ " F.H. Brass)
405	Cap screw fastening contact post to frame ($\frac{1}{4}$ "-13, 1 $\frac{1}{2}$ " Hex. H.)
19879	Screw fastening finger strap to brackets (14-24, 1 $\frac{1}{2}$ " R.H. Blued)
22779	Binding screw for contact posts (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for Nos. 19879, 22779 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for binding post
37959	Shield for interlocking contact post and blow-out spool
51739	Screw fastening shield to back of chute (No. 8, $\frac{3}{8}$ " R.H. Blued)

TYPE DB15, FORM D CONTACTOR

	<i>The following is the only interchangeable part of the DB15-D Contactor which differs from those of the DB15-A:</i>
37961	Blow-out spool, wound, complete, with terminal

TYPE DB15, FORM F CONTACTOR

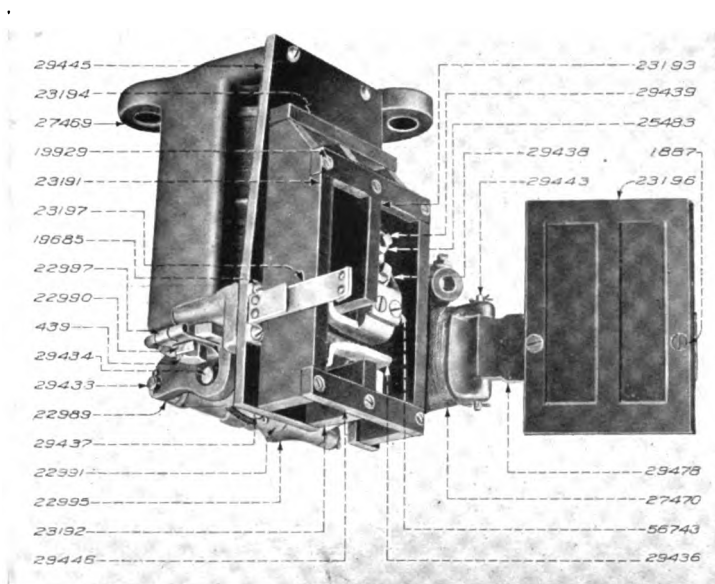
	<i>Following are the interchangeable parts of the Type DB15, Form F Contactor which differ from those of the Type DB15, Form E:</i>
111257	Operating lever
30483	Hinge screw for operating lever and interlock operating lever (14-24, $\frac{1}{2}$ " Fill. H. Sp'l)
111258	Contact finger, complete, with contact tip, terminal and pigtail
111259	Terminal with pigtail
111260	Hinge pin for contact finger and operating lever ($\frac{1}{16}$ "x $\frac{3}{16}$ " Tobin Bronze)
111261	Pressure spring for contact finger (spring steel wire)
110778	Fiber button for spring

TYPE DB23, FORM A CONTACTOR

30426	OPERATING MAGNET SPOOL, complete, DB23-A-6
30427	Operating magnet spool, complete, DB23-A-7
34268	Operating magnet spool, complete, DB23-A-8
40127	Operating magnet spool, complete, DB23-A-9
40173	Operating magnet spool, complete, DB23-A-10
40174	Operating magnet spool, complete, DB23-A-11
40175	Operating magnet spool, complete, DB23-A-12
40176	Operating magnet spool, complete, DB23-A-13
40177	Operating magnet spool, complete, DB23-A-14
40178	Operating magnet spool, complete, DB23-A-15
40196	Operating magnet spool, complete, DB23-A-16
47547	Operating magnet spool, complete, DB23-A-18
47548	Operating magnet spool, complete, DB23-A-19
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
27469	MAGNET FRAME
22987	Screw pole for magnet spool
22988	Spring washer for pole (1 $\frac{1}{2}$ "x3 $\frac{1}{4}$ " Ph. Brz.)
22989	Bearing bracket
439	Cap screw fastening bearing bracket to frame ($\frac{1}{4}$ "-13, 1" Hex. H.)
22990	Washer plate for No. 439
22991	Contact lever
29433	Hinge pin for lever and bracket ($\frac{1}{16}$ "x4 $\frac{1}{16}$ " Tob. Brz.)
4030	Spring cotter for No. 29433 ($\frac{3}{32}$ "x $\frac{1}{8}$ ")

CONTACTORS AND INTERLOCKS

TYPE DB23, FORM A CONTACTOR—(Concluded)



Cat. No.	Description
22993	Plunger for lever
29434	Pin for plunger ($\frac{1}{2}$ " x $4\frac{1}{2}$ ")
29435	Spring cotter for No. 29434 ($\frac{3}{32}$ " x $1\frac{1}{2}$ ")
22995	Contact finger, complete, includes contact tip, terminal and pigtail
29436	Contact tip
56743	Screw fastening contact tip to finger (14-24, $\frac{1}{2}$ " F.H.)
22997	Terminal with pigtail
29437	Hinge pin for finger and lever ($\frac{1}{2}$ " x $3\frac{1}{8}$ " Tob. Brz.)
4030	Spring cotter for No. 29437 ($\frac{3}{32}$ " x $\frac{1}{2}$ ")
29438	Fixed contact base, complete, with contact tip No. 29436, set screws and binding nuts
56743	Screw fastening contact tip to base (14-24, $\frac{1}{2}$ " F.H.)
29439	Set screw for base ($\frac{1}{8}$ "-18, $1\frac{1}{2}$ " Sq. H. Oval Point Sp'l)
25483	Binding nut for set screw ($\frac{1}{8}$ "-18, Hex., Blued Sp'l)
2028	Screw fastening contact base in position (14-24, $\frac{1}{2}$ " F.H.)
29441	Pressure spring for contact finger (Black Steel Wire, $\frac{11}{16}$ " Outside Diam., Open)
23177	Fiber button for spring
27470	Blow-out spool wound, complete, with terminal
27471	Screw fastening No. 27470 to frame ($\frac{1}{2}$ "-16, $3\frac{1}{2}$ " F.H.)
29478	Pole piece with paper packing
29443	Hinge pin for pole piece ($\frac{1}{2}$ " x $3\frac{1}{8}$ ")
5006	Spring cotter for No. 29443 ($\frac{3}{32}$ " x $\frac{1}{2}$ ")
1887	Screw fastening pole piece to door for arc chute (14-24, $\frac{1}{2}$ " F.H.)
29444	Bushing used with No. 1887 (tapped 14-24 thread, Fiber Sp'l)
23189	ARC CHUTE, complete, includes shield for magnet spool, door, door catch and screws for fastening in position
19685	Screw fastening chute and door catch in position (14-24, $\frac{1}{2}$ " R.H. Blued)
29445	Back for chute
23191	Side partition
23192	Middle partition, lower end
23193	Middle partition, upper end
23194	Upper end partition
29446	Partition brace
27884	Shield for magnet spool
23196	Door for arc chute
23197	Catch, complete, for door
19929	Screw fastening parts of partition together (No. 8, $\frac{1}{2}$ " F.H.)

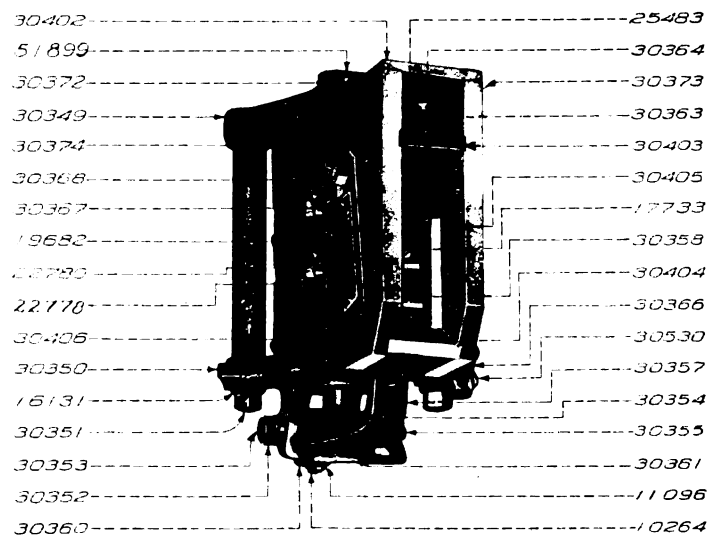
CONTACTORS AND INTERLOCKS

* TYPE DB23, FORM B CONTACTOR

Cat. No.	Description
<i>The following are additional parts used with the DB23-B Contactor, which when added to a DB23-A, convert it into a DB23-B Contactor, all other parts being identical:</i>	
27474	Interlocking contact finger strap, complete, with fingers and screws for fastening to contact lever
27475	Contact finger, complete, with tip and rivet
27476	Interlocking contact post, complete, with all attached parts (right-hand)
27477	Interlocking contact post, complete, with all attached parts (left-hand)
29447	Interlocking contact (right-hand)
29448	Interlocking contact (left-hand)
29449	Screw fastening Nos. 29447, 29448, to post (10-24, $\frac{1}{8}$ " F.H. Brass)
405	Cap screw fastening contact post to frame ($\frac{1}{2}$ "-13, $1\frac{1}{8}$ " Hex. H.)
19879	Screw fastening finger straps to brackets (14-24, $1\frac{1}{8}$ " R.H. Blued)
22779	Binding screw for contact post (14-24, $\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for Nos. 19879, 22779 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for binding post
27478	Shield for interlocking contact post and blow-out spool
51739	Screw fastening shield to back of chute (No. 8, $\frac{1}{8}$ " R.H. Blued)

* See page 251 for illustration of interlocking contact.

TYPE DB31, FORM A CONTACTOR



In the DB31 series, contactors may consist of groups of from one to six units, each group having a common base plate on which the magnet frames are permanently mounted, the units being otherwise identical.

The second figure in the numerical class rating of such groups indicates the number of units composing the groups. Thus DB31 is a contactor of one unit; DB33 a contactor of 3 units of the same series, etc.

Contactors may have on one or more of the units composing the group Form 1 interlocking contacts, which are closed when the main contact is opened, or Form 2 interlocking contacts which are closed when the main contact is closed, or Form 3 interlocking contacts which are a combination of Form 1 and Form 2, or Form 4 interlocking contacts which are a combination of two Form 1 contacts. The location of these interlocking contacts is indicated by form letters following the numerical class rating.

Form A indicates a contactor without interlocking contact.

CONTACTORS AND INTERLOCKS**TYPE DB31, FORM A CONTACTOR—(Concluded)**

Forms B, C, D, E, F and G indicate contactors having Form 1 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Forms H, J, K, L, M and N indicate contactors having Form 2 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Forms BH, CJ, DK, EL, FM and GN indicate contactors having Form 3 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

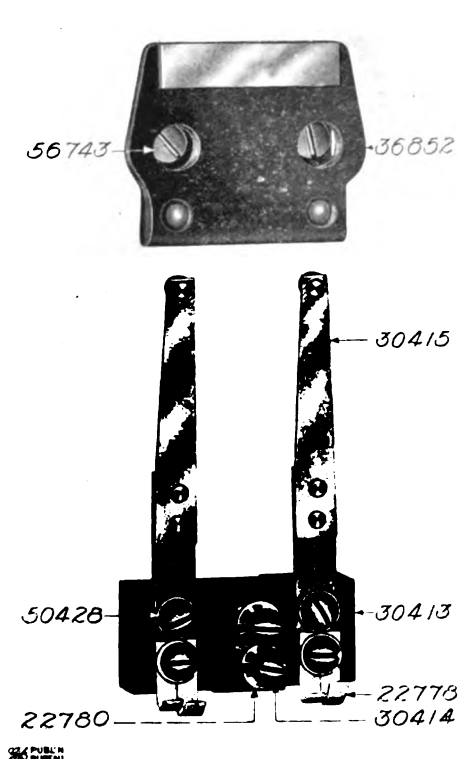
Forms BB, CC, DD, EE, FF and GG indicate contactors having Form 4 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Cat. No.	Description
30345	OPERATING MAGNET SPOOL, complete, DB31-A-3
30346	Operating magnet spool, complete, DB31-A-4
30347	Operating magnet spool, complete, DB31-A-5
30348	Operating magnet spool, complete, DB31-A-6
40125	Operating magnet spool, complete, DB31-A-7
40126	Operating magnet spool, complete, DB31-A-8
47550	Operating magnet spool, complete, DB31-A-9
47551	Operating magnet spool, complete, DB31-A-10
47552	Operating magnet spool, complete, DB31-A-11
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{8}$ "x $\frac{1}{4}$ "x.060")
30349	TOP PLATE, with pillars and magnet pole
30350	Mechanism plate
30351	Cap screw fastening No. 30350 to frame ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
30352	Contact lever
30353	Hinge pin for lever ($\frac{1}{16}$ "x3 $\frac{1}{16}$ " Tob. Brz. Sp'l)
30354	Plunger for lever
30355	Pin for plunger and contact finger ($\frac{1}{16}$ "x3 $\frac{1}{16}$ "
4030	Spring cotter for No. 30355 ($\frac{3}{32}$ "x $\frac{1}{4}$ "
30356	Brass disc for plunger and magnet pole ($1\frac{1}{4}$ "x.062")
30357	CONTACT FINGER, complete, includes contact tip and shunt
30358	Contact tip
17733	Screw fastening contact tip to finger (14-24, $\frac{1}{8}$ " F.H. Blued, Sp'l)
30359	Copper shunt, with phosphor bronze washer plates
56743	Screw fastening No. 30359 to finger (14-24, $\frac{1}{8}$ " F.H.)
30360	Shunt guard
11096	Short screw fastening shunt and guard to mechanism plate (14-24, $\frac{1}{8}$ " R.H. Blued)
10264	Long screw fastening shunt and guard to mechanism plate (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for Nos. 11096, 10264 ($\frac{1}{8}$ "x $\frac{1}{4}$ "x.060")
30361	Pressure spring for contact finger (Black Steel Wire, $\frac{11}{16}$ " Outside Diam. Open)
23177	Fiber button for spring
30362	Fixed contact base
30358	Contact tip
17733	Screw fastening contact tip to base (14-24, $\frac{1}{8}$ " F.H. Blued, Sp'l)
10298	Screw fastening contact base and blow-out coil to arc chute (14-24, $\frac{1}{4}$ " F.H.)
30363	BLOW-OUT COIL, complete, with terminals
30364	Binding screw for No. 30363 ($\frac{5}{16}$ "-18, $1\frac{1}{4}$ " R.H. Round Point, Blued Sp'l)
25483	Binding nut for No. 30364 ($\frac{5}{16}$ "-18, Hex. Blued, Sp'l)
30366	Terminal for frame
30530	Binding screw for No. 30366 ($\frac{5}{16}$ "-18, $\frac{1}{4}$ " R.H. Round Point, Blued, Sp'l)
25483	Check nut for No. 30530 ($\frac{5}{16}$ "-18, Hex. Blued, Sp'l)
30367	POLE PIECE, two halves, with blow-out coil core and cap screw
30368	Cap screw for No. 30367 ($\frac{5}{16}$ "-18, $\frac{1}{4}$ " Hex. H.)
30369	Fiber sleeve for blow-out coil core
30370	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute in position ($\frac{5}{16}$ "-18, $1\frac{1}{4}$ " R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{11}{16}$ "x $\frac{1}{4}$ "x.0625")
30372	Back plate
30373	Side plate (right-hand)
30374	Side plate (left-hand)
30402	Upper end plate
30403	Arcing plate, upper
30404	Arcing plate, lower
30405	Arcing plate, side
30406	Bolt for chute (10-32, 3" Hex. H. Brass)
9962	Nut for bolt (10-32, Hex. Brass)

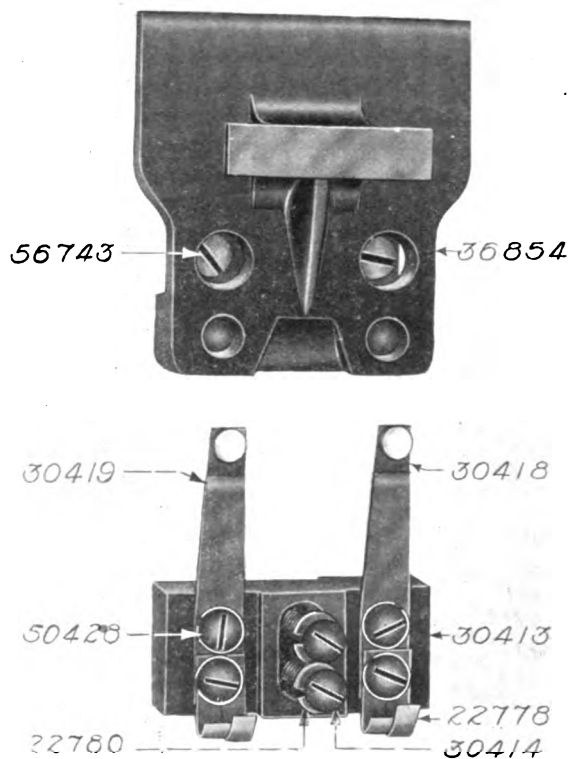
CONTACTORS AND INTERLOCKS

TYPE DB31, FORM A CONTACTOR—(Continued)

Cat. No.	Description
882	Screw fastening back plate to side plates (No. 8, 1" F.H.)
14192	Screw fastening upper end plate to side plates (No. 8, $\frac{1}{4}$ " F.H.)
NOTE: The following are top plates for other contactors of the DB31 Series, all interchangeable parts of the contactors except the top plates, being identical:	
30408	TOP PLATE, with pillars and magnet poles for DB32 Contactor
30409	Top plate, with pillars and magnet poles for DB33 Contactor
30410	Top plate, with pillars and magnet poles for DB34 Contactor
30411	Top plate, with pillars and magnet poles for DB35 Contactor
30412	Top plate, with pillars and magnet poles for DB36 Contactor



Form 1 Interlocking Contact for DB31 Contactor



Form 2 Inverted Interlocking Contact for DB31 Contactor

FORM 1 INTERLOCKING CONTACT

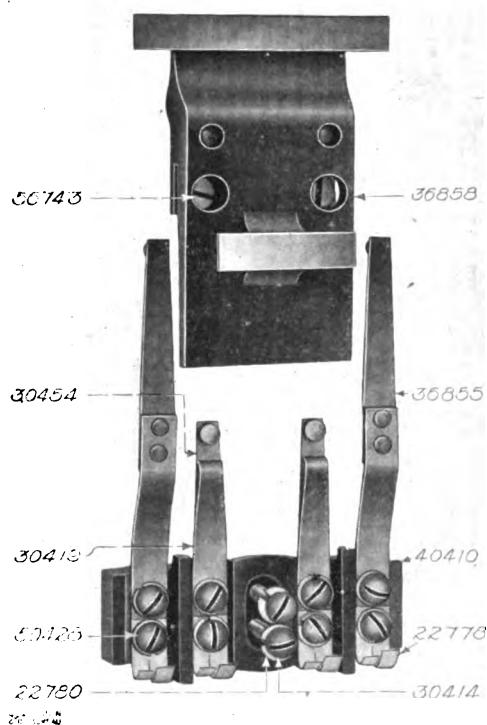
Cat. No.	Description
30413	Contact block
30414	Screw fastening No. 30413 to mechanism plate (14-24, 1 $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 30414 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
30415	Contact finger, complete
30416	Contact finger with contact tip and rivets
50428	Screw fastening finger to block (14-24, $\frac{1}{2}$ " R.H. Blued)
22780	Lock washer No. 50428 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for finger
36852	Contact support, with copper contact
56743	Screw fastening support to contact lever (14-24, $\frac{1}{2}$ " F.H.)

FORM 2 INVERTED INTERLOCKING CONTACT

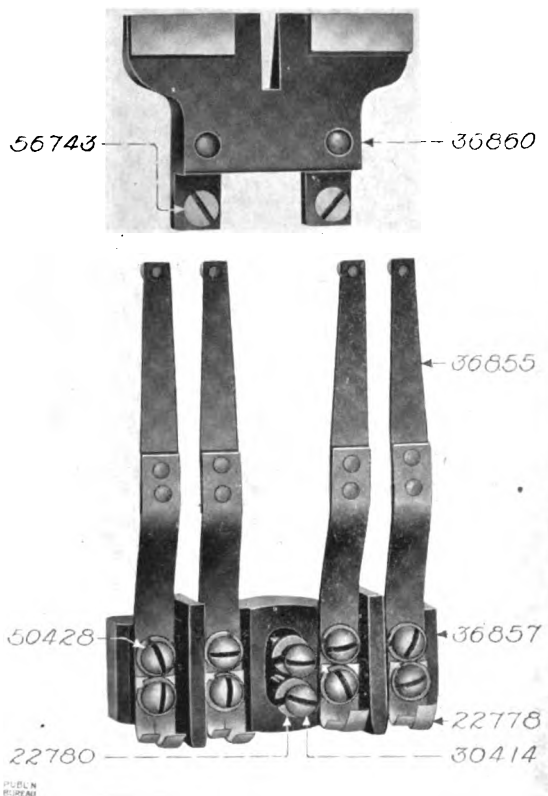
Cat. No.	Description
30413	Contact block
30414	Screw fastening No. 30413 to mechanism plate (14-24, 1 $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 30414 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
30418	Contact finger with contact tip
30419	Contact finger stop
50428	Screw fastening Nos. 30418, 30419 to block (14-24, $\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for finger
36854	Contact support, with copper contact
56743	Screw fastening support to contact lever (14-24, $\frac{1}{2}$ " F.H.)

CONTACTORS AND INTERLOCKS

TYPE DB31, FORM A CONTACTOR—(Concluded)



Form 3 Interlocking Contact for DB31 Contactor



Form 4 Interlocking Contact for DB31 Contactor

FORM 3 INTERLOCKING CONTACT

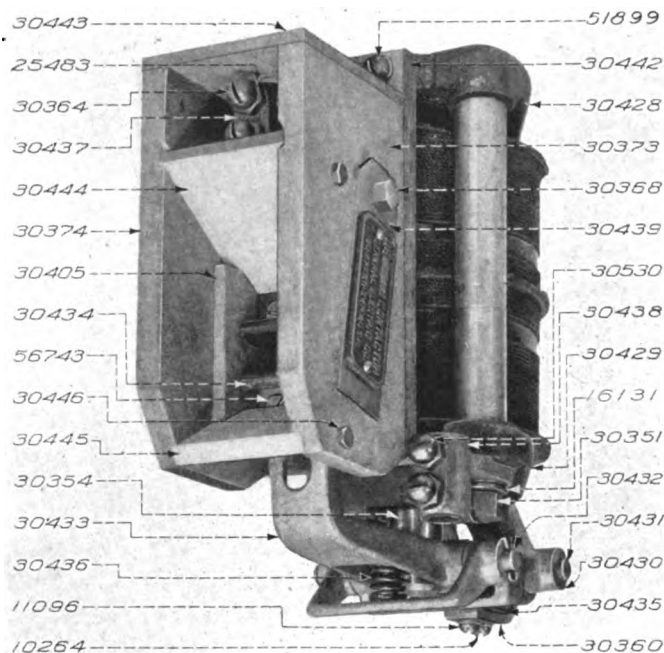
Cat. No.	Description				
40410	Contact block				
30414	Screw fastening No. 40410 to mechanism plate (14-24, 1 3/8" R.H. Blued)				
22780	Lock washer for No. 30414 (1 1/4"x 1/2"x.060")				
36855	Long contact finger, complete				
40411	Contact finger with contact tip and rivets				
30454	Short contact finger with contact tip				
30419	Contact finger stop				
50428	Screw fastening Nos. 36855, 30454, 30419 to block (14-24, 1/2" R.H. Blued)				
22780	Lock washer for No. 50428 (1 1/4"x 1/2"x.060")				
22778	Copper terminal for finger				
36858	Contact support, with copper contacts				
56743	Screw fastening support to contact lever (14-24, 1/2" F.H.)				

FORM 4 INTERLOCKING CONTACT

36857	Contact block				
30414	Screw fastening No. 36857 to mechanism plate (14-24, 1 3/8" R.H. Blued)				
22780	Lock washer for No. 30414 (1 1/4"x 1/2"x.060")				
36855	Contact finger, complete				
40411	Contact finger with contact tip and rivets				
50428	Screw fastening finger to block (14-24, 1/2" R.H. Blued)				
22780	Lock washer for No. 50428 (1 1/4"x 1/2"x.060")				
22778	Copper terminal for finger				
36860	Contact support with copper contacts				
56743	Screw fastening support to contact lever (14-24, 1/2" F.H.)				
30456	INSULATION TUBE for interlock wires (10 1/2" Long, 3/8" Hole)				
30457	Supporting clamp for insulation tube				

CONTACTORS AND INTERLOCKS

TYPE DB41, FORM A CONTACTOR



In the DB41 Series, contactors may consist of groups of from one to six units, each group having a common base plate on which the magnet frames are permanently mounted, the units being otherwise identical.

The second figure in the numerical class rating of such groups indicates the number of units composing the groups. Thus DB41 is a contactor of one unit; DB43 a contactor of three units of the same series, etc.

Contactors may have on one or more of the units composing the group Form 1 interlocking contacts, which are closed when the main contact is opened, or Form 2 interlocking contacts which are closed when the main contact is closed, or Form 3 interlocking contacts which are a combination of Form 1 and Form 2, or Form 4 interlocking contacts which are a combination of two Form 1 contacts. The location of these interlocking contacts is indicated by form letters following the numerical class rating.

Form A indicates a contactor without interlocking contact.

Forms B, C, D, E, F and G indicate contactors having Form 1 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Forms H, J, K, L, M and N indicate contactors having Form 2 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Forms BH, CJ, DK, EL, FM and GN indicate contactors having Form 3 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Forms BB, CC, DD, EE, FF and GG indicate contactors having Form 4 interlocking contacts on the first, second, third, fourth, fifth and sixth units respectively.

Cat. No.	Description
30426	OPERATING MAGNET SPOOL, complete, DB41-A-6
30427	Operating magnet spool, complete, DB41-A-7
34268	Operating magnet spool, complete, DB41-A-8
40127	Operating magnet spool, complete, DB41-A-9
40173	Operating magnet spool, complete, DB41-A-10
40174	Operating magnet spool, complete, DB41-A-11
40175	Operating magnet spool, complete, DB41-A-12
40176	Operating magnet spool, complete, DB41-A-13
40177	Operating magnet spool, complete, DB41-A-14
40178	Operating magnet spool, complete, DB41-A-15

CONTACTORS AND INTERLOCKS

TYPE DB41, FORM A CONTACTOR—(Continued)

Cat. No.	Description
40196	Operating magnet spool, complete, DB41-A-16
47547	Operating magnet spool, complete, DB41-A-18
47548	Operating magnet spool, complete, DB41-A-19
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{11}{16}$ "x $\frac{1}{2}$ "x.060")
30428	TOP PLATE, with pillars and magnet pole
30429	Mechanism plate
30351	Cap screw fastening No. 30429 to frame ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
30430	Contact lever
30431	Hinge pin for lever ($\frac{1}{16}$ "x $\frac{1}{16}$ " Tob. Brz. Sp'l)
30354	Plunger for lever
30432	Pin for plunger and contact finger ($\frac{1}{16}$ "x $\frac{3}{16}$ "
4030	Spring cotter for No. 30432 ($\frac{3}{32}$ "x $\frac{3}{8}$ "
30356	Brass disc for plunger and magnet pole ($1\frac{1}{2}$ "x.062")
30433	CONTACT FINGER, complete, includes contact tip and shunt
30434	Contact tip
30435	Copper shunt, with phosphor bronze washer plates
56743	Screw fastening contact tip and shunt to finger (14-24, $\frac{1}{2}$ " F.H.)
30360	Shunt guard
11096	Short screw fastening shunt and guard to mechanism plate (14-24, $\frac{3}{8}$ " R.H. Blued)
10264	Long screw fastening shunt and guard to mechanism plate (14-24, $1\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for Nos. 11096, 10264 ($\frac{11}{16}$ "x $\frac{1}{2}$ "x.060")
30436	Pressure spring for contact finger (Black Steel Wire, $\frac{11}{16}$ " Outside Diam., Open)
23177	Fiber button for spring
30528	Fixed contact base
30434	Contact tip
56743	Screw fastening contact tip to base (14-24, $\frac{1}{2}$ " F.H.)
10298	Screw fastening contact base and blow-out coil to arc chute (14-24, $\frac{1}{2}$ " F.H.)
30437	Blow-out coil, complete, with terminals
30364	Binding screw for No. 30437 ($\frac{1}{8}$ "-18, $1\frac{1}{2}$ " R.H. Round Point Blued Sp'l)
25483	Check nut for No. 30364 ($\frac{5}{16}$ "-18, Hex. Blued, Sp'l)
30438	Terminal for frame
30530	Binding screw for No. 30438 ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " R.H. Round Point Blued Sp'l)
25483	Check nut for No. 30530 ($\frac{5}{16}$ "-18, Hex. Blued Sp'l)
30439	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 30439 ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H.)
30440	Fiber sleeve for blow-out coil core
30441	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute in position ($\frac{1}{8}$ "-18, $1\frac{1}{2}$ " R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{11}{16}$ "x $\frac{1}{2}$ "x.0625")
30442	Back plate
30373	Side plate (right-hand)
30374	Side plate (left-hand)
30443	Upper end plate
30444	Arcing plate, upper
30445	Arcing plate, lower
30405	Arcing plate, side
30446	Bolt for chute (10-32, $3\frac{1}{2}$ " Hex. H. Brass)
882	Screw fastening back plate to side plate (No. 8, $1\frac{1}{2}$ " F.H.)
9962	Nut for bolt (10-32, Hex. Brass)
14192	Screw fastening upper end plate to side plates (No. 8, $\frac{1}{2}$ " F.H.)
NOTE: The following are top plates for other contactors of the DB41 Series, all interchangeable parts of the contactors except the top plates being identical:	
30447	TOP PLATE, with pillars and magnet poles for DB42 Contactor
30448	Top plate, with pillars and magnet poles for DB43 Contactor
30449	Top plate, with pillars and magnet poles for DB44 Contactor
30450	Top plate, with pillars and magnet poles for DB45 Contactor
30451	Top plate, with pillars and magnet poles for DB46 Contactor

FORM 1 INTERLOCKING CONTACT

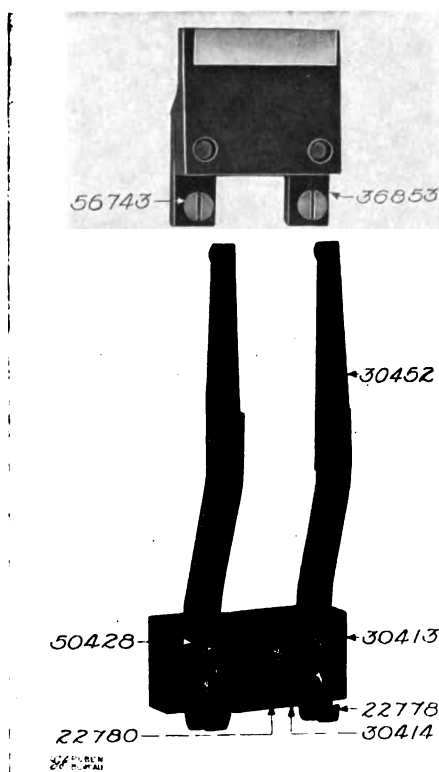
30413	Contact block
30414	Screw fastening No. 30413 to mechanism plate (14-24, $1\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for No. 30414 ($\frac{11}{16}$ "x $\frac{1}{2}$ "x.060")

CONTACTORS AND INTERLOCKS

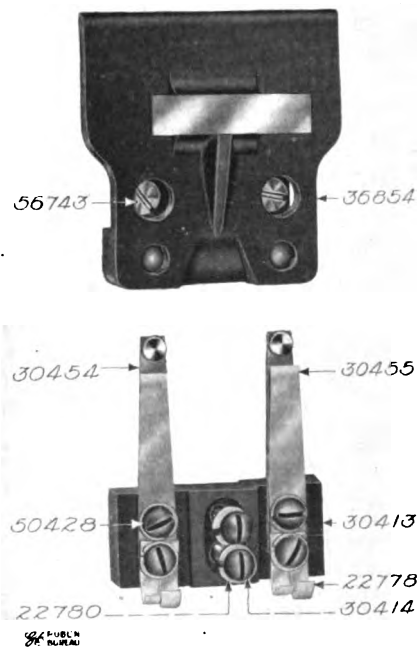
TYPE DB41, FORM A CONTACTOR—(Continued)

FORM 1 INTERLOCKING CONTACT

Cat. No.	Description
30452	Contact finger, complete
30416	Contact finger, with contact tip and rivets
50428	Screw fastening finger to block (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22778	Copper terminal for finger
36853	Contact support, with copper contact
56743	Screw fastening support to contact lever (14-24, $\frac{1}{4}$ " F.H.)



Form 1 Interlocking Contact for DB41 Contactor



Form 2 Interlocking Contact for DB41 Contactor

FORM 2 INVERTED INTERLOCKING CONTACT

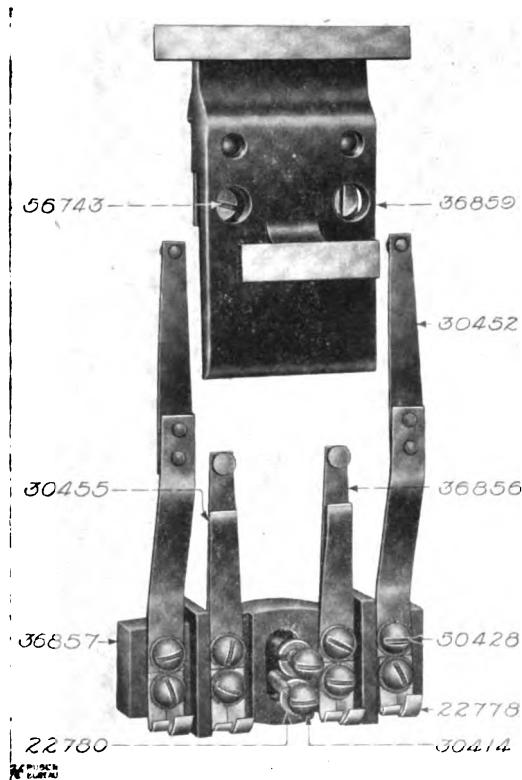
30413	Contact block
30414	Screw fastening No. 30413 to mechanism plate (14-24, $1\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for No. 30414 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
30454	Contact finger with contact tip
30455	Contact finger stop
50428	Screw fastening Nos. 30454, 30455 to block (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22778	Copper terminal for finger
36854	Contact support, with copper contact
56743	Screw fastening support to contact lever (14-24, $\frac{1}{4}$ " F.H.)

CONTACTORS AND INTERLOCKS

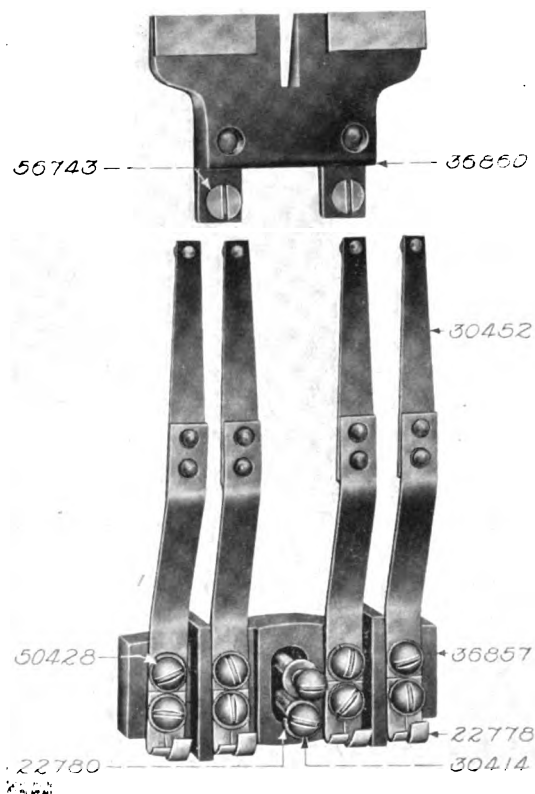
TYPE DB41, FORM A CONTACTOR—(Concluded)

FORM 3 INTERLOCKING CONTACT

Cat. No.	Description
36857	Contact block
30414	Screw fastening No. 36857 to mechanism plate (14-24, 1½" R.H. Blued)
22780	Lock washer for No. 30414 (½"x½"x.060")
30452	Long contact finger, complete
30416	Contact finger with contact tip and rivets
36856	Short contact finger with contact tip
30455	Contact finger stop
50428	Screw fastening Nos. 30452, 36856, 30455 to block (14-24, ½" R.H. Blued)
22780	Lock washer for No. 50428 (½"x½"x.060")
22778	Copper terminal for finger
36859	Contact support, with copper contacts
56743	Screw fastening support to contact lever (14-24, ½" F.H.)



Form 3 Interlocking Contact for DB41 Contactor



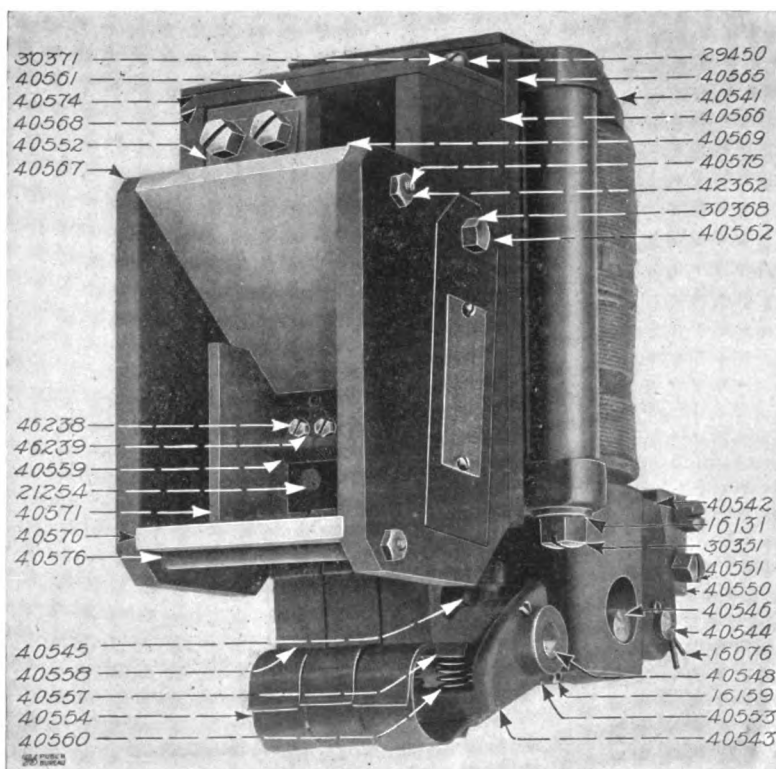
Form 4 Interlocking Contact for DB41 Contactor

FORM 4 INTERLOCKING CONTACT

36857	Contact block
30414	Screw fastening No. 36857 to mechanism plate (14-24, 1½" R.H. Blued)
22780	Lock washer for No. 30414 (½"x½"x.060")
30452	Contact finger, complete
30416	Contact finger with contact tip and rivets
50428	Screw fastening finger to block (14-24, ½" R.H. Blued)
22780	Lock washer for No. 50428 (½"x½"x.060")
22778	Copper terminal for finger
36860	Contact support, with copper contacts
56743	Screw fastening support to contact lever (14-24, ½" F.H.)
30456	INSULATION TUBE for interlock wires (10½" Long, ½" Hole)
30457	Supporting clamp, for insulation tube

CONTACTORS AND INTERLOCKS

TYPE DB51, FORM B CONTACTOR



Cat. No.	Description
40538	OPERATING MAGNET SPOOL, complete, DB51-B-1
40539	Operating magnet spool, complete, DB51-B-2
40540	Operating magnet spool, complete, DB51-B-3
46227	Operating magnet spool, complete, DB51-B-4
46228	Operating magnet spool, complete, DB51-B-5
46229	Operating magnet spool, complete, DB51-B-6
46230	Operating magnet spool, complete, DB51-B-7
46235	Operating magnet spool, complete, DB51-B-8
46236	Operating magnet spool, complete, DB51-B-9
46327	Operating magnet spool, complete, DB51-B-10
47545	Operating magnet spool, complete, DB51-B-11
47546	Operating magnet spool, complete, DB51-B-12
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
40541	TOP PLATE, with pillars and magnet pole
40542	Mechanism plate
30351	Cap screw fastening No. 40542 to top plate ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
40543	Contact lever
40544	Hinge pin for lever ($\frac{3}{8}$ "x $4\frac{1}{4}$ " Tob. Brz.)
16076	Spring cotter for No. 40544 ($\frac{3}{8}$ "x1")
40545	Plunger for lever
40546	Pin for plunger and contact lever ($\frac{3}{8}$ "x $5\frac{1}{4}$ " Tob. Brz. Sp'l)
32908	Locking screw for No. 40546 (8-32, 1" Headless, Sp'l)
40549	Brass disc for plunger and magnet pole ($1\frac{1}{4}$ "x.060")
40550	Terminal for mechanism plate
40551	Clamping screw for No. 40550 ($\frac{3}{8}$ "-16, $\frac{3}{4}$ " Hex. H. Slot. Cap Screw)
40552	Lock washer plate for No. 40551

CONTACTORS AND INTERLOCKS

TYPE DB51, FORM B CONTACTOR—(Concluded)

Cat. No.	Description
29423	Screw fastening terminal and laminated shunt to mechanism plate (14-24, 1½" F.H.)
40553	Laminated shunt, with guards, for contact lever and mechanism plate
40554	Laminated shunt, with guards, for contact finger and lever
56743	Screw fastening Nos. 40553, 40554 in position (14-24, ½" F.H.)
40557	Washer plate for No. 56743
40558	CONTACT FINGER, complete, with contact tip
40559	Contact tip
46238	Cap screw fastening contact tip to finger (14-24, ½" Hex. H. Slot. Blued)
22780	Lock washer for No. 46238 (¼"x½"x.060")
40548	Pin for contact fingers and contact lever (⅝"x1⅞")
16159	Spring cotter for No. 40548 (½"x1¼")
40560	Pressure spring for contact finger (Black Steel Wire)
23177	Fiber button for spring
40561	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
40559	Contact tip
46238	Cap screw fastening contact tip to base (14-24, ½" Hex. H. Slot. Blued)
22780	Lock washer for No. 46238 (¼"x½"x.060")
40551	Clamping screw for blow-out coil terminal (⅜"-16, ⅜" Hex. H. Slot. Cap Screw)
40552	Lock washer plate for No. 40551
307	Long screw fastening No. 40561 to arc chute (14-24, 1" F.H.)
56743	Short screw fastening No. 40561 to arc chute (14-24, ½" F.H.)
40562	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 40562 (⅝"-18, ½" Hex. H.)
40563	Fiber sleeve for blow-out coil core
40564	ARC CHUTE, complete, includes screws and washers for fastening in position
30371	Screw fastening chute to top plate (⅝"-18, 1½" R.H. Blued)
21254	Screw fastening chute to mechanism plate (⅝"-18, 1½" F.H.)
47173	Lock washer for No. 30371 (¾"x⅝"x.0625")
40565	Back plate
40566	Side plate (right-hand)
40567	Side plate (left-hand)
40568	Upper end plate
40569	Arcing plate, upper
40570	Arcing plate, lower
40571	Arcing plate, side
40572	Outside insulation for back plate
40573	Inside insulation for back plate
40574	Insulation for upper end plate
14246	Screw fastening No. 40573 to back plate (10-32, ⅜" F.H.)
882	Screw fastening back plate to side plates (No. 8, 1" F.H.)
1013	Screw fastening insulation and upper end plate to side plates (No. 8, ⅜" F.H.)
40575	Stud for chute (10-32, 5⅜" long)
40576	Fiber sleeve for stud
42362	Nut for Nos. 14246, 40575 (10-32, ⅜" thick, Hex. Brass, Sp'l)

TYPE DB51, FORM C CONTACTOR

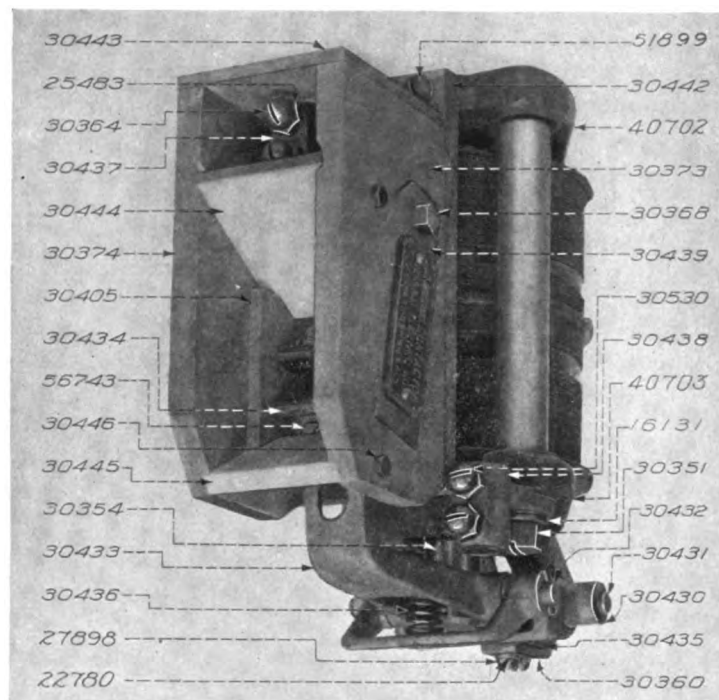
	<i>Following is the only interchangeable part of the DB51-C Contactor which differs from those of the DB51-B:</i>
40580	BLOW-OUT COIL, complete, with terminal, contact base and contact tip

TYPE DB61, FORM A CONTACTOR

30426	OPERATING MAGNET SPOOL, complete, DB61-A-6
30427	Operating magnet spool, complete, DB61-A-7
34268	Operating magnet spool, complete, DB61-A-8
40127	Operating magnet spool, complete, DB61-A-9
40173	Operating magnet spool, complete, DB61-A-10
40174	Operating magnet spool, complete, DB61-A-11
40175	Operating magnet spool, complete, DB61-A-12
40176	Operating magnet spool, complete, DB61-A-13
40177	Operating magnet spool, complete, DB61-A-14
40178	Operating magnet spool, complete, DB61-A-15
40196	Operating magnet spool, complete, DB61-A-16
47547	Operating magnet spool, complete, DB61-A-18
47548	Operating magnet spool, complete, DB61-A-19
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, ⅜" R.H. Blued)
22780	Lock washer for No. 19682 (¼"x½"x.060")

CONTACTORS AND INTERLOCKS

TYPE DB61, FORM A CONTACTOR—(Continued)



Cat. No.

Description

40702	TOP PLATE, with pillars and magnet pole
40703	Mechanism plate
30351	Cap screw fastening No. 40703 to frame ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
30430	Contact lever
30431	Hinge pin for lever ($\frac{1}{8}$ "x $\frac{1}{8}$ " Tob. Brz. Sp'l)
30354	Plunger for lever
30432	Pin for plunger and contact finger ($\frac{1}{8}$ "x $\frac{1}{8}$ "
4030	Spring cotter for No. 30432 ($\frac{1}{32}$ "x $\frac{1}{8}$ "
30356	Brass disc for plunger and magnet pole ($1\frac{1}{2}$ "x.062")
30433	CONTACT FINGER, complete, includes contact tip and shunt
30434	Contact tip
30435	Copper shunt, with phosphor bronze washer plates
56743	Screw fastening contact tip and shunt to finger (14-24, $\frac{1}{4}$ " F.H.)
30360	Shunt guard
27898	Screw fastening shunt and guard to mechanism plate (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 27898 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
30436	Pressure spring for contact finger (Black Steel Wire, $\frac{1}{16}$ " Diam. Open)
23177	Fiber button for spring
30528	Fixed contact base
30434	Contact tip
56743	Screw fastening contact tip to base (14-24, $\frac{1}{4}$ " F.H.)
10298	Screw fastening contact base and blow-out coil to arc chute (14-24, $\frac{1}{4}$ " F.H.)
30437	Blow-out coil, complete, with terminals
30364	Binding screw for No. 30437 ($\frac{1}{8}$ "-18, 1" R.H. Round Point Blued, Sp'l)
25483	Check nut for No. 30364 ($\frac{1}{8}$ "-18, Hex. Blued, Sp'l)
30438	Terminal for frame
30530	Binding screw for No. 30438 ($\frac{1}{8}$ "-18, $\frac{1}{4}$ " R.H. Round Point, Blued, Sp'l)
25483	Check nut for No. 30530 ($\frac{1}{8}$ "-18, Hex. Blued, Sp'l)
30439	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 30439 ($\frac{1}{8}$ "-18, $\frac{1}{4}$ " Hex. H.)
30440	Fiber sleeve for blow-out coil core

CONTACTORS AND INTERLOCKS**TYPE DB61, FORM A CONTACTOR— (Concluded)**

Cat. No.	Description
30441	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute in position ($\frac{1}{8}$ "-18, 1" R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{3}{4}$ "x $\frac{1}{4}$ "x.0625")
30442	Back plate
30373	Side plate (right-hand)
30374	Side plate (left-hand)
30443	Upper end plate
30444	Arcing plate, upper
30445	Arcing plate, lower
30405	Arcing plate, side
30446	Bolt for chute (10-32, 3 $\frac{1}{4}$ " Hex. H. Brass)
882	Screw fastening back plate to side plate (No. 8, 1" F.H.)
9962	Nut for bolt (10-32, Hex. Brass)
14192	Screw fastening upper end plate to side plates (No. 8, $\frac{1}{4}$ " F.H.)
	NOTE: The following are top plates for other contactors of the DB61-A Series, all interchangeable parts of the contactors except top plates, being identical.
40704	TOP PLATE, with pillars and magnet poles for DB62-A Contactor
40705	Top plate, with pillars and magnet poles for DB63-A Contactor

TYPE DB61, FORM B CONTACTOR

	<i>Following are the only interchangeable parts of the DB61-B Contactor which differ from those of the DB61-A:</i>
40706	Contact lever
40707	Hinge bracket for interlock
32953	Screw fastening hinge bracket and shunt to mechanism base plate (14-24, 1 $\frac{1}{4}$ " R.H. Blued)

TYPE DB61, FORM C CONTACTOR

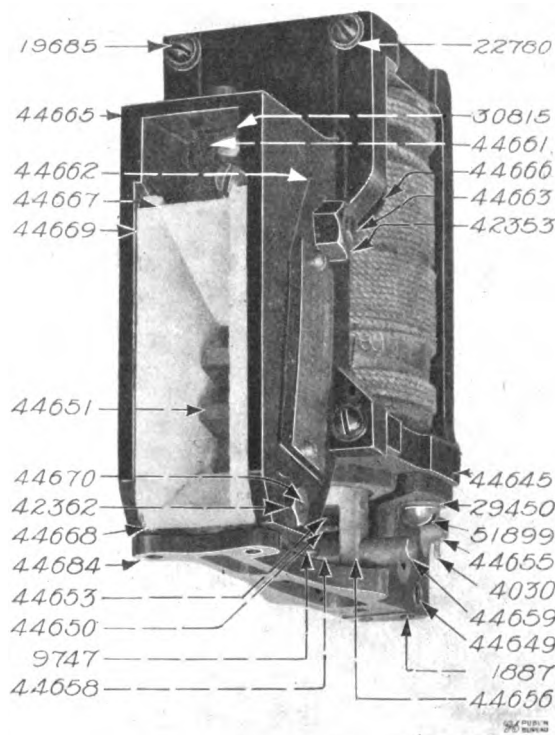
	<i>Following are the only interchangeable parts of the DB61-C Contactor which differ from those of the DB61-A:</i>
30428	TOP PLATES, with pillars and magnet pole
40708	Mechanism plate
	NOTE: The following are top plates for other contactors of the DB61-C Series, all interchangeable parts of the contactors except the top plates being identical.
30447	TOP PLATE, with pillars and magnet poles for DB62-C Contactor
30448	Top plate, with pillars and magnet poles for DB63-C Contactor

TYPE DB61, FORM D CONTACTOR

	<i>Following are the only interchangeable parts of the DB61-D Contactor which differ from those of the DB61-A:</i>
30428	TOP PLATE, with pillars and magnet pole
40709	Mechanism plate
40710	Contact lever, with pin and rivet
40711	Hinge bracket for interlock
307	Screw fastening No. 40711 to mechanism plate (14-24, 1" F.H.)
51668	Hinge pin for interlock ($\frac{1}{8}$ "x3 $\frac{1}{4}$ ")
4030	Spring cotter for No. 51668 ($\frac{3}{16}$ "x $\frac{1}{4}$ ")
40712	Shunt guard
40713	Screw fastening shunt and guard to mechanism plate (14-24, 1 $\frac{1}{4}$ " F.H. Blued)
	NOTE: The following are top plates for other contactors of the DB61-D Series, all interchangeable parts of the contactors except the top plates being identical.
30447	TOP PLATE, with pillars and magnet poles for DB62-D Contactor
30448	Top plate, with pillars and magnet poles for DB63-D Contactor

CONTACTORS AND INTERLOCKS

TYPE DB91, FORMS A AND D CONTACTORS



Cat. No.	Description
42331	OPERATING MAGNET SPOOL, complete, DB91-D-1
42338	Operating magnet spool, complete, DB91-D-2
42357	Operating magnet spool, complete, DB91-D-3
47549	Operating magnet spool, complete, DB91-D-4
44086	Copper terminal for magnet spool
35807	Screw fastening terminal in position (10-32, $\frac{1}{8}$ " R.H. Blued)
40582	Lock washer for No. 35807 ($\frac{1}{8}$ "x $\frac{1}{4}$ "x.044")
44645	MAGNET FRAME
44646	Set screw for frame (14-24, 1" Headless, Sp'l)
44647	Magnet core, with brass sleeve
44684	Contact support and terminal block, complete
44649	Terminal bushing
1887	Clamping screw for No. 44684 (14-24, $\frac{1}{4}$ " F.H.)
51899	Screw fastening No. 44684 to magnet frame ($\frac{1}{8}$ "-18, 1" R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{1}{8}$ "x $\frac{1}{4}$ "x.0625")
44650	HINGED CONTACT FINGER, complete, with contact tip and shunt
44651	Contact tip
30815	Cap screw fastening No. 44651 to finger (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{8}$ "x $\frac{1}{4}$ "x.060")
44652	Hinge, with spring and rivets
44653	Laminated shunt
10076	Screw fastening shunt to contact support (10-32, $\frac{1}{8}$ " F.H.)
44654	Washer plate for No. 10076
44655	Hinge pin for contact finger ($\frac{1}{8}$ "x2" Tob. Brz.)
4030	Spring cotter for No. 44655 ($\frac{1}{8}$ "x $\frac{1}{4}$ ")
44656	Plunger with bearing pin for hinged contact finger
44657	Bearing pin for No. 44656
44658	Bearing sleeve for plunger
44659	Pin for bearing sleeve ($\frac{1}{8}$ "x2 $\frac{1}{2}$ ")
9747	Spring cotter for Nos. 44658, 44659 ($\frac{1}{8}$ "x1")
44660	Brass disc for plunger and magnet core (1 $\frac{1}{2}$ "x.030")

CONTACTORS AND INTERLOCKS**TYPE DB91, FORMS A AND D CONTACTORS—(Concluded)**

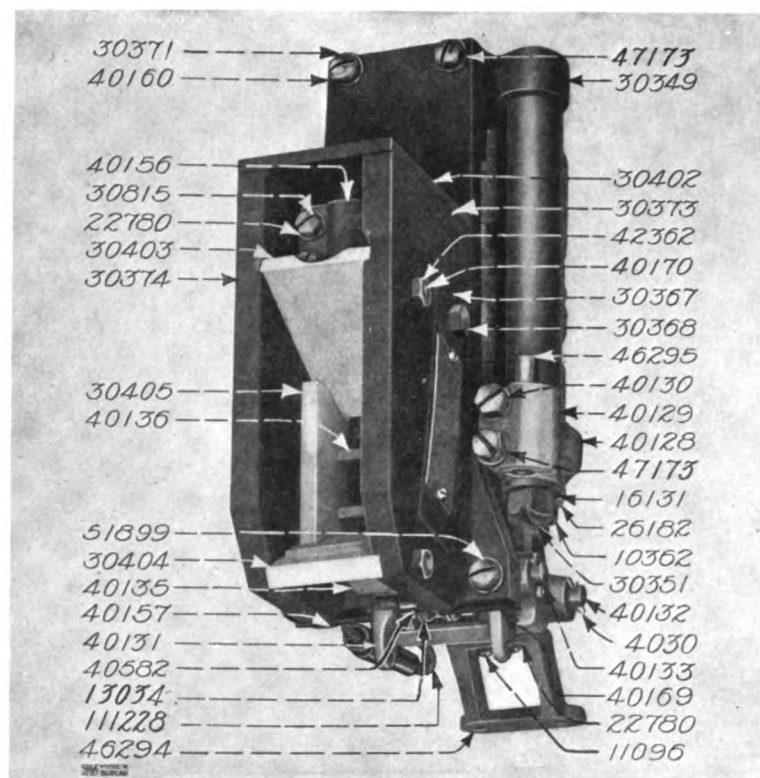
Cat. No.	Description
44661	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
44651	Contact tip
30815	Cap screw fastening No. 44651 to contact base and clamping screw for terminal (14-24, $\frac{3}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
44649	Terminal bushing
2028	Large screw fastening No. 44661 to arc chute (14-24, $\frac{3}{8}$ " F.H.)
14246	Small screw fastening No. 44661 to arc chute (10-32, $\frac{3}{8}$ " F.H.)
44662	POLE PIECE, two parts, with blow-out coil core
44663	Blow-out coil core ($\frac{3}{8}$ "-16, 2 $\frac{1}{2}$ " Hex. H. Semi-Fin. Bolt)
42353	Nut for No. 44663 ($\frac{3}{8}$ "-16, $\frac{1}{4}$ " thick, $\frac{1}{4}$ " across flats, Hex. Cham. one side)
44664	Insulation sleeve for No. 44663
44665	ARC CHUTE, complete, includes screws and washers for fastening in position
19685	Screw fastening chute to magnet frame (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19685 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
44666	Back plate
10214	Screw fastening No. 44666 to chute (No. 8, $\frac{1}{2}$ " F.H.)
44667	Arcing plate, upper
44668	Arcing plate, lower
44669	Arcing plate, side
44670	Cap screw for chute (10-32, 2 $\frac{1}{2}$ " Hex. H. Brass)
42362	Nut for No. 44670 (10-32, Hex. Brass Sp'l)

TYPE DB131, FORMS A AND B CONTACTORS

30345	OPERATING MAGNET SPOOL, complete, DB131-A-3
30346	Operating magnet spool, complete, DB131-A-4
30347	Operating magnet spool, complete, DB131-A-5
30348	Operating magnet spool, complete, DB131-A-6
40125	Operating magnet spool, complete, DB131-A-7
40126	Operating magnet spool, complete, DB131-A-8
47550	Operating magnet spool, complete, DB131-A-9
47551	Operating magnet spool, complete, DB131-A-10
47552	Operating magnet spool, complete, DB131-A-11
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
30349	TOP PLATE, with pillars and magnet pole
40128	Mechanism plate
40129	Terminal for mechanism plate
46295	Bushing for terminal
40130	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{3}{8}$ " Hex. H. Slot. Blued)
47173	Lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.0625")
30351	Cap screw fastening No. 40128 to top plate and long screw fastening No. 40129 to mechanism plate ($\frac{1}{2}$ "-13, 1 $\frac{1}{2}$ " Hex. H. Slot.)
10362	Short cap screw fastening No. 40129 to mechanism plate ($\frac{3}{8}$ "-16, $\frac{3}{8}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
26182	Lock washer for No. 10362
40131	Contact lever
40132	Hinge pin for lever ($\frac{1}{8}$ "x3 $\frac{1}{2}$ " Tob. Bronze)
4030	Spring cotter for No. 40132 ($\frac{3}{32}$ "x $\frac{1}{8}$ ")
30354	Plunger for lever
40133	Pin for plunger and contact lever ($\frac{1}{8}$ "x3 $\frac{1}{8}$ ")
4030	Spring cotter for No. 40133 ($\frac{3}{32}$ "x $\frac{1}{8}$ ")
40134	Brass disc for plunger and magnet pole (1 $\frac{1}{2}$ "x.030")
46294	Supporting bracket for interlock
11096	Screw fastening No. 46294 to mechanism plate (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 11096 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
40135	CONTACT FINGER, complete, with contact tip
40136	Contact tip
30815	Screw fastening contact tip to finger (14-24, $\frac{3}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
40149	Pin for contact finger and contact lever ($\frac{1}{8}$ "x3 $\frac{1}{8}$ " Tob. Brz.)

CONTACTORS AND INTERLOCKS

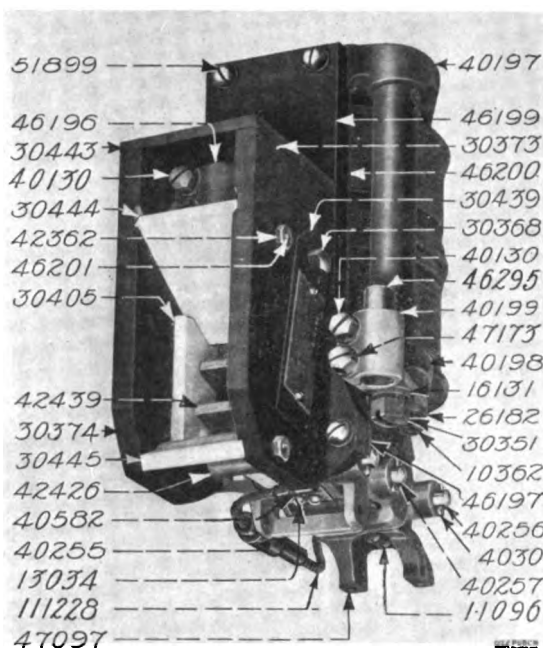
TYPE DB131, FORMS A AND B CONTACTORS—(Continued)



Cat. No.	Description
4030	Spring cotter for No. 40149 ($\frac{1}{8}$ "x $\frac{1}{8}$ ")
111228	Flexible pigtail connector, with terminals and support, for finger and mechanism plate
13034	Screw fastening No. 111228 to finger (10-32, $\frac{1}{8}$ " R.H. Brass)
40582	Lock washer for No. 13034 ($\frac{1}{8}$ "x $\frac{1}{8}$ "x.044")
40153	Large pressure spring for contact finger (Steel Wire)
40154	Small pressure spring for contact finger (Steel Wire)
40155	Brass bushing for No. 40153
23177	Fiber button for No. 40154
36908	Washer for No. 23177 ($\frac{1}{2}$ "x1"x.060")
40156	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
40136	Contact tip
46295	Bushing for terminal
30815	Screw fastening contact tip to base and clamping screw for terminal (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{8}$ "x $\frac{1}{8}$ "x.060")
307	Long screw fastening No. 40156 to arc chute (14-24, 1" F.H.)
1887	Short screw fastening No. 40156 to arc chute (14-24, $\frac{3}{4}$ " F.H.)
30367	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 30367 ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Hex. H.)
30369	Fiber sleeve for blow-out coil core
40157	Supporting bracket for arc chute for DB131-A Contactor only. For the DB131-B Contactor this bracket is replaced by the interlock casting
40158	Screw fastening No. 40157 to mechanism plate ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " F.H.)
40159	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute to supporting bracket ($\frac{1}{8}$ "-18, 1" R.H. Blued)
30371	Screw fastening chute to top plate ($\frac{1}{8}$ "-18, 1 $\frac{1}{2}$ " R.H. Blued)
47173	Lock washer for Nos. 51899, 30371 ($\frac{1}{8}$ "x $\frac{1}{8}$ "x.0625")
40160	Back plate
30373	Side plate (right-hand)
30374	Side plate (left-hand)
30402	Upper end plate

CONTACTORS AND INTERLOCKS**TYPE DB131, FORMS A AND B CONTACTORS—(Concluded)**

Cat. No.	Description
30403	Arcing plate, upper
30404	Arcing plate, lower
30405	Arcing plate, side
40169	Insulation for back plate
14192	Screw fastening No. 40169 to back plate and upper end plate to side plates (No. 8, $\frac{1}{2}$ " F.H.)
882	Screw fastening back plate to side plates (No. 8, 1" F.H.)
40170	Stud for chute (10-32, $3\frac{1}{4}$ " long)
42362	Nut for No. 40170 (10-32, $\frac{3}{32}$ " thick, Hex. H. Brass Sp'l)
NOTE: The following are top plates for other contactors of the DB131 Series, all interchangeable parts of the contactors except the top plates, being identical.	
30408	TOP PLATE, with pillars and magnet pole for DB132 contactor
30409	Top plate, with pillars and magnet pole, for DB133 contactor

TYPE DB141, FORMS A AND B CONTACTORS

30426	OPERATING MAGNET SPOOL, complete, DB141-A-6
30427	Operating magnet spool, complete, DB141A-7
34268	Operating magnet spool, complete, DB141A-8
40127	Operating magnet spool, complete, DB141A-9
40173	Operating magnet spool, complete, DB141A-10
40174	Operating magnet spool, complete, DB141-A-11
40175	Operating magnet spool, complete, DB141-A-12
40176	Operating magnet spool, complete, DB141-A-13
40177	Operating magnet spool, complete, DB141-A-14
40178	Operating magnet spool, complete, DB141-A-15
40196	Operating magnet spool, complete, DB141-A-16
47547	Operating magnet spool, complete, DB141-A-18
47548	Operating magnet spool, complete, DB141-A-19
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060")
40197	TOP PLATE, with pillars and magnet pole

CONTACTORS AND INTERLOCKS

TYPE DB141, FORMS A AND B CONTACTORS—(Continued)

Cat. No.	Description
40198	Mechanism plate
40199	Terminal for mechanism plate
46295	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
* 40200	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
* 59419	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
40130	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Hex. H. Slot. Blued)
47173	Lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.0625")
30351	Cap screw fastening No. 40198 to top plate and long screw fastening No. 40199 to mechanism plate ($\frac{1}{2}$ "-13, 1 $\frac{1}{2}$ " Hex. H. Slot.)
10362	Short cap screw fastening No. 40199 to mechanism plate ($\frac{1}{8}$ "-16, $\frac{1}{8}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
26182	Lock washer for No. 10362
40255	Contact lever
40256	Hinge pin for lever ($\frac{1}{16}$ "x3 $\frac{1}{4}$ " Tob. Bronze)
4030	Spring cotter for No. 40256 ($\frac{1}{32}$ "x $\frac{1}{8}$ ")
30354	Plunger for lever
40257	Pin for plunger and contact lever ($\frac{1}{16}$ "x3 $\frac{1}{4}$ ")
4030	Spring cotter for No. 40257 ($\frac{1}{32}$ "x $\frac{1}{8}$ ")
47097	Supporting bracket for interlock
11096	Screw fastening No. 47097 to mechanism plate (14-24, $\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for No. 11096 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.060")
42426	CONTACT FINGER, complete, with contact tip
42439	Contact tip
30815	Screw fastening contact tip to finger (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.060")
40256	Pin for contact finger and contact lever ($\frac{1}{16}$ "x3 $\frac{1}{4}$ " Tob. Brz.)
4030	Spring cotter for No. 40256 ($\frac{1}{32}$ "x $\frac{1}{8}$ ")
111228	Flexible pigtail connector, with terminals and support, for finger and mechanism plate
13034	Screw fastening No. 111228 to finger (10-32, $\frac{1}{8}$ " R.H. Brass)
40582	Lock washer for No. 13034 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.044")
46193	Large pressure spring for contact finger (Steel Wire)
46194	Small pressure spring for contact finger (Steel Wire)
40155	Brass bushing for No. 46193
23177	Fiber button for No. 46194
46195	Washer for No. 23177 ($\frac{1}{2}$ "x1"x.034")
46196	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
42439	Contact tip
30815	Screw fastening contact tip to base (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.060")
46295	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
* 40200	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
* 59419	Bushing for terminal ($\frac{1}{16}$ " diam., $\frac{1}{8}$ " cable hole)
40130	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Hex. H. Slot. Blued)
47173	Lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.0625")
10298	Screw fastening No. 46196 to arc chute (14-24, $\frac{1}{8}$ " F.H.)
30439	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 30439 ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Hex. H.)
30440	Fiber sleeve for blow-out coil core
46197	Supporting bracket for arc chute for DB141-A Contactor only. For DB141-B Contactor, this bracket is replaced by the interlock casting
40158	Screw fastening No. 46197 to mechanism plate ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " F.H.)
46198	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute in position ($\frac{1}{8}$ "-18, 1" R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.0625")
46199	Back plate
30373	Side plate (right-hand)
30374	Side plate (left-hand)
30443	Upper end plate
30444	Arcing plate, upper
30445	Arcing plate, lower
30405	Arcing plate, side
46200	Insulation for back plate
14192	Screw fastening No. 46200 to back plate and upper end plate to side plates (No. 8, $\frac{1}{8}$ " F.H.)
882	Screw fastening back plates to side plates (No. 8, 1" F.H.)

* A number of Type DB141 Contactors have been sold with terminal bushings Cat. Nos. 40200 and 59419. For the convenience of customers having these contactors these bushings are also listed.

CONTACTORS AND INTERLOCKS**TYPE DB141, FORMS A AND B CONTACTORS—(Concluded)**

Cat. No.	Description
46201	Stud for chute (10-32, $3\frac{1}{8}$ " long)
42362	Nut for stud (10-32, $\frac{3}{32}$ " thick, Hex. Brass Sp'l)
	NOTE: The following are top plates for other contactors of the DB141 Series, all interchangeable parts of the contactors except the top plates, being identical.
46202	TOP PLATE, with pillars and magnet pole for DB142 Contactor
46203	Top plate, with pillars and magnet pole for DB143 Contactor

TYPE DB141, FORM C CONTACTOR

Following are the only interchangeable parts of the DB141-C Contactor which differ from those of the DB141-A:

46204	TOP PLATE, with pillars and magnet pole
46205	Mechanism plate

TYPE DB141, FORM D CONTACTOR

Following is the only interchangeable part of the DB141-D Contactor which differs from those of the DB141-A:

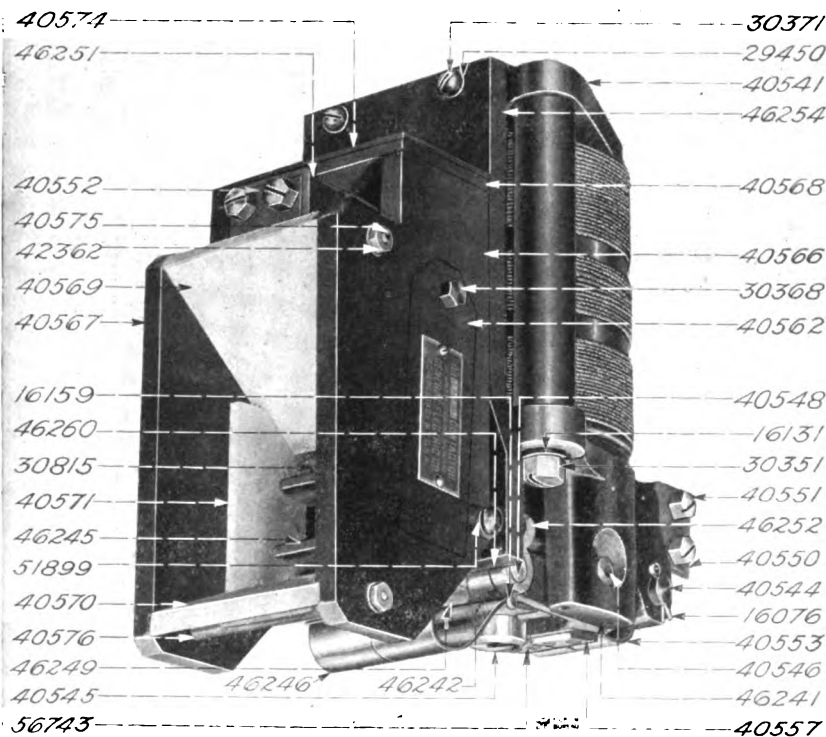
46206	Contact lever
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TYPE DB151, FORM A CONTACTOR

40538	OPERATING MAGNET SPOOL, complete, DB151-A-1
40539	Operating magnet spool, complete, DB151-A-2
40540	Operating magnet spool, complete, DB151-A-3
46227	Operating magnet spool, complete, DB151-A-4
46228	Operating magnet spool, complete, DB151-A-5
46229	Operating magnet spool, complete, DB151-A-6
46230	Operating magnet spool, complete, DB151-A-7
46235	Operating magnet spool, complete, DB151-A-8
46236	Operating magnet spool, complete, DB151-A-9
46237	Operating magnet spool, complete, DB151-A-10
47545	Operating magnet spool, complete, DB151-A-11
47546	Operating magnet spool, complete, DB151-A-12
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{1}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
40541	TOP PLATE, with pillars and magnet pole
46241	Mechanism plate
30351	Cap screw fastening No. 46241 to top plate ($\frac{1}{8}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
16131	Lock washer for No. 30351
46242	Contact lever
40544	Hinge pin for lever ($\frac{1}{8}$ "x $4\frac{1}{4}$ " Tob. Brz.)
16076	Spring cotter for No. 40544 ($\frac{1}{8}$ "x1")
40545	Plunger for lever
14410	Set screw for plunger ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Headless Sp'l)
40546	Pin for plunger and contact lever ($\frac{1}{8}$ "x $5\frac{1}{4}$ " Tob. Brz. Sp'l)
32908	Locking screw for No. 40546 (8-32, 1" Headless, Sp'l)
40549	Brass disc for plunger and magnet pole ($1\frac{1}{4}$ "x.060")
40550	Terminal for mechanism plate
40551	Clamping screw for No. 40550 ($\frac{1}{8}$ "-16, $\frac{1}{8}$ " Hex. H. Slot. Cap Screw)
40552	Lock washer plate for No. 40551
40553	Laminated shunt, with guards, for contact lever and mechanism plate
56743	Screw fastening No. 40553 to contact lever (14-24, $\frac{1}{8}$ " F.H.)
10298	Screw fastening Nos. 40550, 40553, to mechanism plate (14-24, $\frac{1}{8}$ " F.H.)
40557	Washer plate for No. 56743

CONTACTORS AND INTERLOCKS

TYPE DB151, FORM A CONTACTOR—(Continued)



Cat. No.	Description
46243	CONTACT FINGER, complete, with contact tip (right-hand)
46244	Contact finger, complete, with contact tip (left-hand)
46245	Contact tip
30815	Cap screw fastening contact tip to finger (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
40548	Pin for contact fingers and contact lever ($\frac{1}{8}$ "x $\frac{1}{4}$ "
16159	Spring cotter for No. 40548 ($\frac{1}{8}$ "x $\frac{1}{4}$ "
46246	Laminated shunt, with guards, for contact finger and contact lever
56743	Screw fastening No. 46246 in position (14-24, $\frac{1}{4}$ " F.H.)
46249	Washer plate for No. 56743
40555	Pressure spring for contact finger
46250	Fiber button for spring
46251	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
46245	Contact tip
30815	Cap screw fastening contact tip to base (14-24, $\frac{1}{8}$ " Hex. H. Slot. Blued)
22780	Lock washer for No. 30815 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
40551	Clamping screw for blow-out coil terminal ($\frac{1}{8}$ "-16, $\frac{1}{4}$ " Hex. H. Slot. Cap Screw)
40552	Lock washer plate for No. 40551
307	Long screw fastening No. 46251 to arc chute (14-24, 1" F.H.)
56743	Short screw fastening No. 46251 to arc chute (14-24, $\frac{1}{4}$ " F.H.)
40562	POLE PIECE, two parts, with blow-out coil core and cap screw
30368	Cap screw for No. 40562 ($\frac{1}{8}$ "-18, $\frac{1}{4}$ " Hex. H.)
40563	Fiber sleeve for blow-out coil core
46252	Supporting bracket for arc chute
10576	Screw fastening No. 46252 to mechanism plate ($\frac{1}{8}$ "-18, 1" F.H.)
46253	ARC CHUTE, complete, includes screws and washers for fastening in position
51899	Screw fastening chute to supporting bracket ($\frac{1}{8}$ "-18, 1" R.H. Blued)
30371	Screw fastening chute to top plate ($\frac{1}{8}$ "-18, 1 $\frac{1}{4}$ " R.H. Blued)
47173	Lock washer for Nos. 51899, 30371 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.0625")

CONTACTORS AND INTERLOCKS

TYPE DB151, FORM A CONTACTOR—(Concluded)

Cat. No.	Description
46254	Back plate
40566	Side plate (right-hand)
40567	Side plate (left-hand)
40568	Upper end plate
40569	Arcing plate, upper
40570	Arcing plate, lower
40571	Arcing plate, side
46260	Insulation for back plate
40574	Insulation for upper end plate
882	Screw fastening back plate to side plate (No. 8, 1" F.H.)
1013	Screw fastening insulation and upper end plate to side plates (No. 8, $\frac{3}{4}$ " F.H.)
40575	Stud for chute (10-32, 5 $\frac{1}{2}$ " Long)
40576	Fiber sleeve for stud
42362	Nut for stud (10-32, $\frac{3}{32}$ " Thick, Hex. Brass, Sp'l)

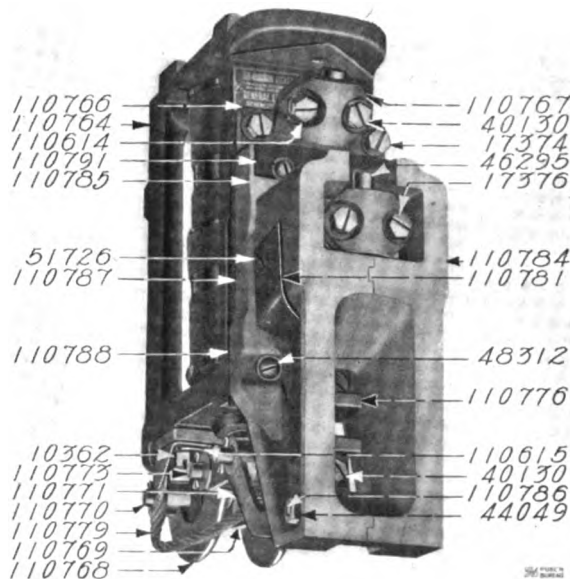
TYPE DB151, FORM C CONTACTOR

Following is the only interchangeable part of the DB151-C Contactor which differs from those of the DB151-A:

46261

BLOW-OUT COIL, complete, with terminal contact base and contact tip

TYPE DB160, FORMS D AND A CONTACTORS



110759	OPERATING MAGNET SPOOL, complete, DB160-D-1
110760	Operating magnet spool, complete, DB160-D-2
110761	Operating magnet spool, complete, DB160-D-3
110762	Operating magnet spool, complete, DB160-D-4
110763	Operating magnet spool, complete, DB160-D-5
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")

CONTACTORS AND INTERLOCKS

TYPE DB160, FORMS D AND A CONTACTORS—(Concluded)

Cat. No.	Description
110764	MAGNET FRAME with bushing for plunger
110765	Magnet pole
110766	Terminal, complete, for frame
110767	Clamp for terminal
46295	Bushing for terminal
40130	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Blued Cap Screw)
110614	Positive lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " thick)
17374	Cap screw fastening No. 110766 to magnet frame ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110614	Positive lock washer for No. 17374 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
*110768	Operating lever
110769	Hinge bracket for operating lever
10362	Cap screw fastening hinge bracket to magnet frame ($\frac{1}{8}$ "-16, $\frac{1}{2}$ " Hex. H. Slot.)
110615	Positive lock washer for No. 10362 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.125")
110770	Hinge pin for operating lever and bracket ($\frac{1}{8}$ "x3 $\frac{1}{2}$ " Tobin Bronze)
110771	Plunger for operating lever
110772	Brass disc for plunger and magnet pole
110773	Pin for plunger and operating lever ($\frac{1}{8}$ "x3 $\frac{1}{2}$ " Zinc Plated)
110774	Spring cotter for Nos. 110770, 110773 ($\frac{3}{32}$ "x $\frac{1}{2}$ " Sherardized)
*110775	Contact lever
110776	Contact tip
40130	Cap screw fastening contact tip to contact lever ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110614	Positive lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
110773	Pin for contact and operating levers ($\frac{1}{8}$ "x3 $\frac{1}{2}$ " Zinc Plated)
110774	Spring cotter for No. 110773 ($\frac{3}{32}$ "x $\frac{1}{2}$ " Sherardized)
110777	Pressure spring for contact lever
110778	Fiber button for spring
110779	Flexible pigtail connector with terminals, for contact lever and magnet frame
17375	Cap screw fastening No. 110779 to contact lever ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Sherardized)
110614	Positive lock washer for No. 17375 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
48135	Washer for No. 17375 ($\frac{3}{4}$ "x $\frac{1}{2}$ "x.060" Brass)
110780	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
110776	Contact tip
40130	Cap screw fastening contact tip to base ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110614	Positive lock washer for No. 40130 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
110767	Clamp for terminal
46295	Bushing for terminal
17376	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Cap Screw Sherardized)
110614	Positive lock washer for No. 17376 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
40158	Screw fastening No. 110780 in position ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " F.H.)
110781	POLE PIECE, two parts, with blow-out coil core and screw
51726	Screw for No. 110781 ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " F.H.)
110782	Fiber sleeve for blow-out coil core
110783	ARC CHUTE, two parts, complete, with stud
110784	Arc chute side, right-hand
110785	Arc chute side, left-hand
110786	Stud for chute (14-24, 2 $\frac{1}{2}$ " Long Brass)
44049	Nut for stud (14-24, $\frac{1}{2}$ " Thick, $\frac{1}{2}$ " across flats, Hex. Cham. One Side Blued)
110624	Positive lock washer for No. 44049 ($\frac{3}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
110787	Back plate for arc chute
110788	Insulation plate between back plate and magnet frame
48312	Screw fastening arc chute and back plate to magnet frame (14-24, 1 $\frac{1}{2}$ " R.H. Blued)
110624	Positive lock washer for No. 48312 ($\frac{3}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{32}$ " Thick)
110789	Washer for No. 48312 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.014")
110790	Fiber sleeve for No. 48312
110791	Washer plate for No. 48312

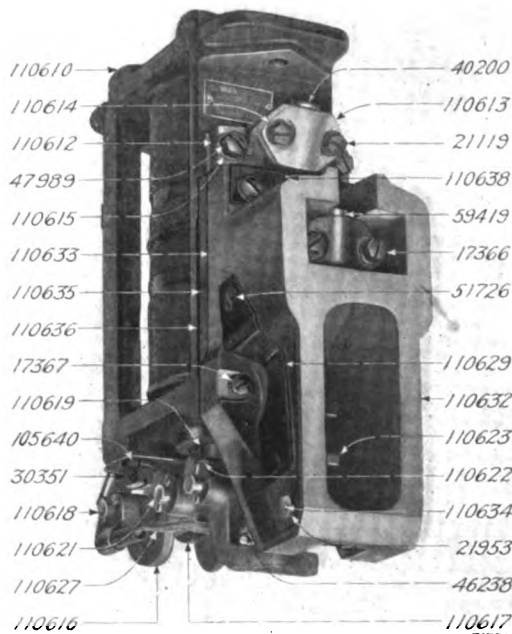
* Must be ordered together for Form A Contactor, whereupon the Contactor becomes Form D.

CONTACTORS AND INTERLOCKS

TYPE DB160, FORM C CONTACTOR

Cat. No.	Description
<i>Following are the interchangeable parts of the Type DB160, Form C Contactor which differ from those of the Type DB160, Form D:</i>	
110802	MAGNET FRAME with bushing for plunger
110795	Operating lever
110803	Hinge bracket for operating lever
110800	POLE PIECE, two parts, galvanized, with blow-out coil core and screw
17380	Screw for No. 110800 ($\frac{1}{8}$ "-18, $\frac{3}{8}$ " F.H. Zinc Plated)
110801	ARC CHUTE, two parts, complete, with stud
17381	Stud for chute (14-24, $3\frac{1}{8}$ " Long Brass)
17382	Large nut for stud (14-24, $\frac{1}{2}$ " thick, $\frac{1}{2}$ " across flats, Hex. Brass Sp'l)
22213	Small nut for stud (14-24, $\frac{1}{2}$ " thick, $\frac{1}{2}$ " across flats Hex. Flat Brass)
22245	Screw fastening arc chute and back plate to magnet frame (14-24, $1\frac{1}{4}$ " R.H. Brass)

TYPE DB166, FORM A CONTACTOR



110605	OPERATING MAGNET SPOOL, complete, DB166-A-1
110606	Operating magnet spool, complete, DB166A-2
110607	Operating magnet spool, complete, DB166A-3
110608	Operating magnet spool, complete, DB166A-4
110609	Operating magnet spool, complete, DB166A-5
22778	Copper terminal for magnet spool
19682	Screw fastening terminal in position (14-24, $\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
110610	MAGNET FRAME with bushing for plunger
110611	Magnet pole
110612	Terminal, complete, for frame
110613	Clamp for terminal
40200	Bushing for terminal
21119	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Blued Cap Screw)
110614	Positive lock washer for No. 21119 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{1}{2}$ " Thick)
47989	Cap screw fastening No. 110612 to magnet frame ($\frac{3}{8}$ "-16, $1\frac{1}{4}$ " Hex. H. Slot. Blued)
110615	Positive lock washer for No. 47989 ($\frac{1}{2}$ "x $\frac{3}{4}$ "x.125")

CONTACTORS AND INTERLOCKS

TYPE DB166, FORM A CONTACTOR—(Concluded)

Cat. No.	Description
110616	Operating lever
110617	Hinge bracket for operating lever
30351	Cap screw fastening hinge bracket to magnet frame ($\frac{1}{2}$ "-13, $1\frac{1}{4}$ " Hex. H. Slot.)
105640	Positive lock washer for No. 30351 ($\frac{1}{2}$ "x $1\frac{1}{2}$ "x $\frac{3}{4}$ "x.125")
110618	Hinge pin for operating lever and bracket ($\frac{1}{2}$ "x $3\frac{1}{4}$ " Tobin Bronze)
110619	Plunger for operating lever
110620	Brass disc for plunger and magnet pole
110621	Pin for plunger and operating lever ($\frac{1}{2}$ "x $3\frac{1}{4}$ "
16118	Spring cotter for Nos. 110618, 110621 ($\frac{1}{2}$ "x $\frac{1}{4}$ "
110622	Contact lever
110623	Contact tip
30815	Cap screw fastening contact tip to contact lever (14-24, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110624	Positive lock washer for No. 30815 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
110621	Pin for contact and operating lever ($\frac{1}{2}$ "x $3\frac{1}{4}$ "
16118	Spring cotter for No. 110621 ($\frac{1}{2}$ "x $\frac{1}{4}$ "
110625	Pressure spring for contact lever (Spring Steel Wire)
110626	Fiber button for spring
110627	Flexible pigtail connector with terminals and support, for contact lever and magnet frame
46238	Cap screw fastening No. 110627 to contact lever (14-24, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110624	Positive lock washer for No. 46238 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
110628	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
110623	Contact tip
30815	Cap screw fastening contact tip to base (14-24, $\frac{1}{2}$ " Hex. H. Slot. Blued)
110624	Positive lock washer for No. 30815 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
110613	Clamp for terminal
59419	Bushing for terminal
17366	Clamping screw for terminal ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Hex. H. Slot. Sherardized Cap Screw)
110614	Positive lock washer for No. 17366 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)
10576	Screw fastening No. 110628 in position ($\frac{1}{8}$ "-18, 1" F.H.)
110629	POLE PIECE, two parts, with blow-out coil core and screw
51726	Screw for No. 110629 ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " F.H.)
110630	Fiber sleeve for blow-out coil core
110631	ARC CHUTE, two parts, complete, with stud
110632	Arc chute side, right-hand
110633	Arc chute side, left-hand
110634	Stud for chute (14-24, 3" Long Brass)
21953	Nut for stud (14-24, $\frac{3}{16}$ " Thick, $\frac{1}{2}$ " across flats, Hex. Brass Cham. both sides)
110624	Positive lock washer for No. 21953 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
110635	Back plate for arc chute
110636	Insulation plate between back plate and magnet frame
17367	Screw fastening arc chute and back plate to magnet frame ($\frac{1}{8}$ "-18, 2" R.H.)
110614	Positive lock washer for No. 17367 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)
24262	Washer for No. 17367 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.0625")
110637	Fiber sleeve for No. 17367
110638	Washer plate for No. 17367

TYPE DB166, FORM B CONTACTOR

Following are the interchangeable parts of the DB166, Form B Contactor which differ from those of the Type DB166, Form A:

110639	Magnet frame with bushing for plunger
110640	Hinge bracket for operating lever
110641	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
17368	Clamping screw for terminal ($\frac{1}{8}$ "-16, $\frac{1}{2}$ " Hex. H. Slot. Cap Screw)
40552	Lock washer for plate No. 17368
110643	ARC CHUTE, two parts, complete, with stud
110644	Arc chute side, right-hand
110645	Arc chute side, left-hand

TYPE DB166, FORM C CONTACTOR

Following are the interchangeable parts of the Type DB166, Form C Contactor which differ from those of the Type DB166, Form A:

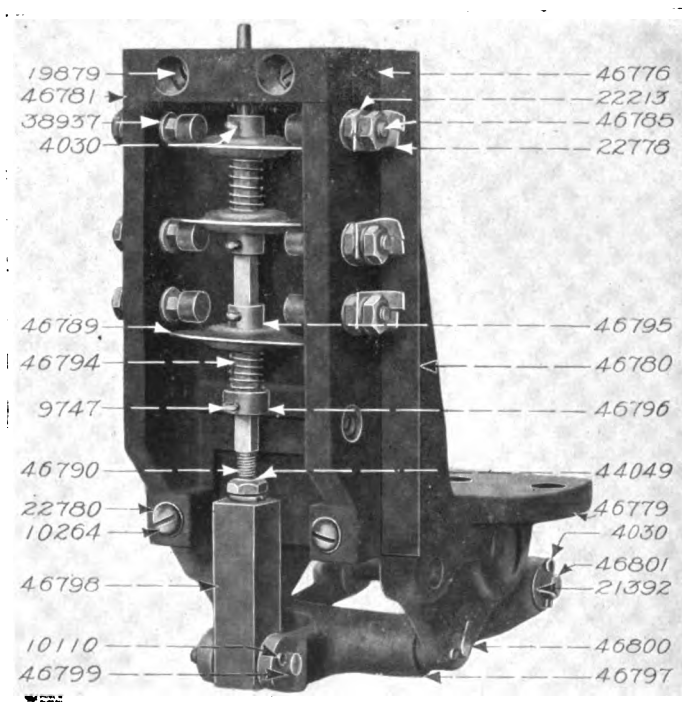
110646	Operating lever
110647	Hinge bracket for operating lever

CONTACTORS AND INTERLOCKS**TYPE DB166, FORM D CONTACTOR**

Cat. No.	Description
<i>Following are the interchangeable parts of the Type DB166, Form D Contactor which differ from those of the DB166, Form A:</i>	
110639	Magnet frame with bushing for plunger
110646	Operating lever
110647	Hinge bracket for operating lever
110641	BLOW-OUT COIL, complete, with terminal, contact base and contact tip
17368	Clamping screw for terminal ($\frac{3}{8}$ "-16, $\frac{1}{2}$ " Hex. H. Slot. Cap Screw Sherardized)
40552	Lock washer plate for No. 17368
110643	ARC CHUTE, two parts, complete, with stud
110644	Arc chute side, right-hand
110645	Arc chute side, left-hand

TYPE DI-15, FORMS A-4, A-5, A-7 AND B-12 INTERLOCKS FOR USE WITH TYPE DB15 FORMS E AND F CONTACTOR

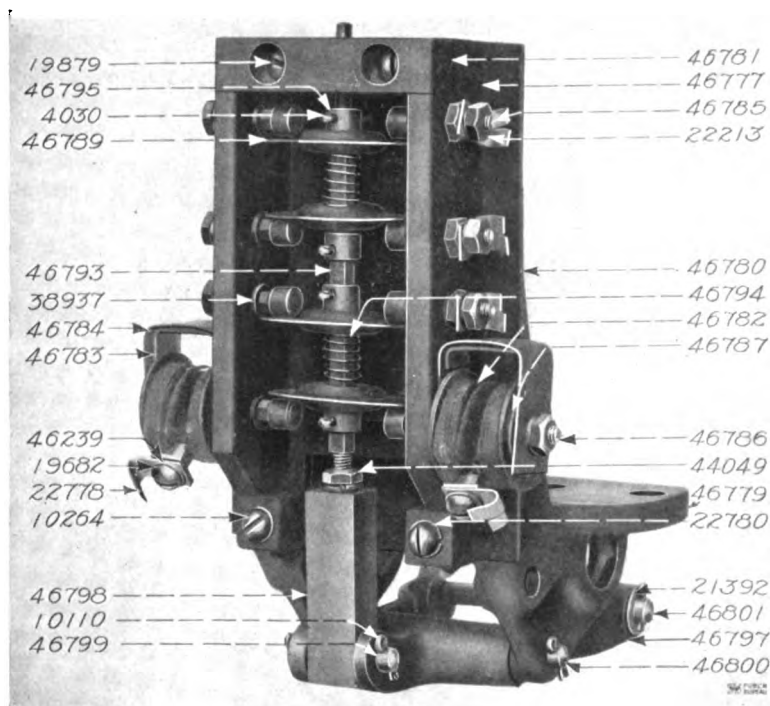
46776	INTERLOCK FRAME, for Form A-4 Interlock
46777	Interlock frame, for Forms A-5 and B-12 Interlocks
46778	Interlock frame, for Form A-7 interlock
46779	Supporting bracket for interlock
46780	Insulation between interlock frame and supporting bracket
46781	Bearing block for shaft
19879	Screw fastening bearing block and long screw fastening interlock frame and insulation to supporting bracket (14-24, 1 $\frac{1}{2}$ " R.H. Blued)
10264	Short screw fastening interlock frame and insulation to supporting bracket (14-24, 1" R.H. Blued)
22780	Lock washer for Nos. 10264, 19879 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46782	BLOW-OUT COIL, complete, for Form B-12 Interlock
22778	Copper terminal for blow-out coil
19682	Screw fastening terminal in position (14-24, $\frac{3}{8}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")

TYPE DI-15 INTERLOCK

NOTE: The above illustration of the Type DI-15, Form A-4 Interlock is representative of Forms A-5 and A-7. The difference being in the number and position of the contact discs.

CONTACTORS AND INTERLOCKS

TYPE DI-15 INTERLOCK—(Concluded)

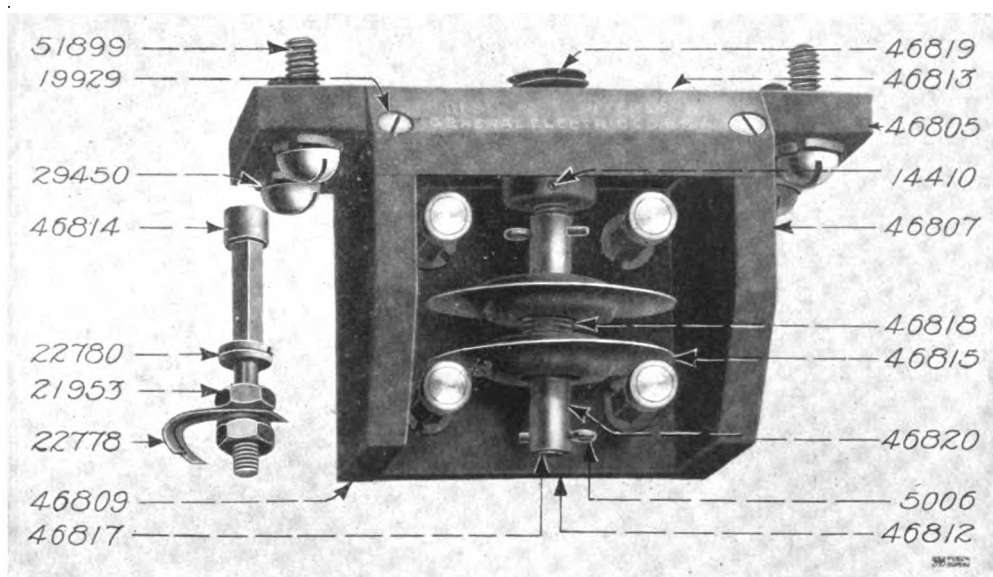


Type DI-15, Form B-12 Interlock

Cat. No.	Description
46783	Pole piece for blow-out coil
46784	Insulation for pole piece
46785	Contact stud for Forms A-4, A-5 and A-7, and short stud for Form B-12 Interlocks
46786	Long contact stud for Form B-12 Interlock
38937	Washer for No. 46785 and small washer for No. 46786 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
46787	Large washer for No. 46786 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22213	Nut for Nos. 46785, 46786 (14-24, Hex. Brass)
22780	Lock washer for nut ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22778	Copper terminal for contact stud
46789	Contact disc
46790	Shaft for contact discs, for Form A-4 Interlock
46791	Shaft for contact discs, for Form A-5 Interlock
46792	Shaft for contact discs, for Form A-7 Interlock
46793	Shaft for contact discs, for Form B-12 Interlock
46794	Pressure spring for contact discs
46795	Brass collar for shaft for Forms A-5 and B-12 and small collar for Forms A-4 and A-7 Interlocks
46796	Large brass collar for Forms A-4 and A-7 Interlocks
4030	Spring cotter for No. 46795 ($\frac{3}{8}$ "x $\frac{1}{8}$ ")
9747	Spring cotter for No. 46796 ($\frac{3}{8}$ "x1")
44049	Adjusting nut for shaft (14-24, Hex. Blued, Cham. one side)
22780	Lock washer for No. 44049 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
46797	Operating lever
46798	Insulating connector for operating lever and shaft
46799	Pin for Nos. 46797, 46798 ($\frac{1}{8}$ "x1 $\frac{1}{8}$ ")
46800	Pin for operating lever and supporting bracket ($\frac{1}{8}$ "x4 $\frac{1}{8}$ ")
46801	Pin for operating lever and contactor contact finger and lever ($\frac{1}{8}$ "x4")
10110	Spring cotter for Nos. 46799, 46800 ($\frac{1}{8}$ "x $\frac{1}{8}$ ")
4030	Spring cotter for No. 46801 ($\frac{3}{8}$ "x $\frac{1}{8}$ ")
21392	Washer for No. 46801 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")

CONTACTORS AND INTERLOCKS

TYPE DI-51, FORMS A-1, A-2 AND A-3 INTERLOCKS FOR USE WITH TYPE DB51, FORM B AND TYPE DB151, FORM A CONTACTORS

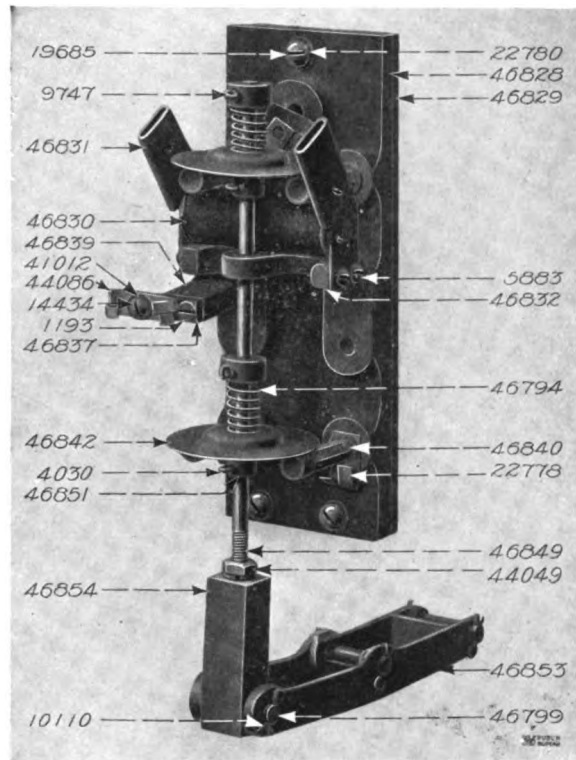


NOTE: The accompanying illustration of the Type DI-51, Form A-3 Interlock is representative of Forms A-1 and A-2. The difference being in the number and position of the contact discs.

Cat. No.	Description
46802	INTERLOCK BOX, complete, for Form A-1 Interlock
46803	Interlock box, complete, for Form A-2 Interlock
46804	Interlock box, complete, for Form A-3 Interlock
46805	Top plate
46806	Side plate (right-hand) for Nos. 46802, 46803
46807	Side plate (right-hand) for No. 46804
46808	Side plate (left-hand) for Nos. 46802, 46803
46809	Side plate (left-hand) for No. 46804
46810	Back plate, for No. 46802
46811	Back plate, for No. 46803
46812	Back plate, for No. 46804
46813	Front plate
19929	Screw fastening plates together (No. 8, $\frac{1}{2}$ " F.H.)
51899	Screw fastening interlock box in position ($\frac{1}{8}$ "-18, 1" R.H. Blued)
47173	Lock washer for No. 51899 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.0625")
46814	CONTACT STUD
21953	Nut for No. 46814 (14-24, Hex. Brass, Cham. both sides)
22780	Lock washer for No. 21953 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for contact stud
46815	Contact disc
46816	Shaft for contact disc, for Forms A-1 and A-2 Interlocks
46817	Shaft for contact discs, for Form A-3 Interlock
46818	Pressure spring for contact disc
46819	Insulating connector for shaft and contact plunger
14410	Set screw for No. 46819 ($\frac{1}{8}$ "-18, $\frac{1}{2}$ " Headless Sp ¹)
46820	Brass sleeve for shaft
5006	Spring cotter for No. 46820 ($\frac{1}{8}$ "x $\frac{1}{2}$ ")
46821	Brass collar for shaft, for Forms A-1 and A-2 Interlocks
9747	Spring cotter for No. 46821 ($\frac{1}{8}$ "x1")

CONTACTORS AND INTERLOCKS

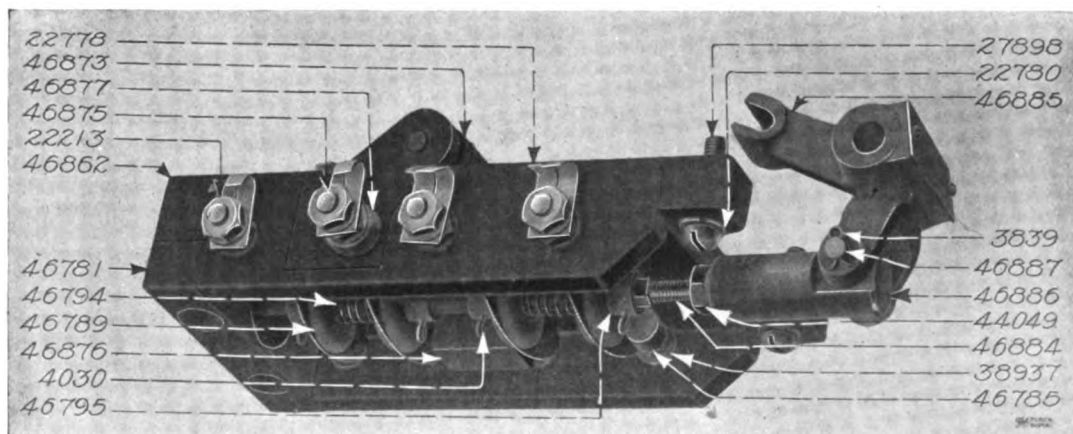
TYPE DI-61, FORMS A-1, A-2, A-3, A-4, A-5, B-5 AND B-6 INTERLOCKS FOR USE WITH TYPE DB61, FORM B CONTACTOR—(Continued)



Type DI-61, Form B-6 Interlock

Cat. No.	Description
46837	Terminal base, for Forms B-5 and B-6 Interlocks
44086	Copper terminal for No. 46837
14434	Screw fastening terminal in position (8-32, $\frac{3}{8}$ " R.H. Blued)
41012	Lock washer for No. 14434 ($\frac{1}{8}$ "x $\frac{3}{8}$ "x.044")
46838	Supporting block for No. 46837 for Form B-5 Interlock
46839	Supporting block for No. 46837 for Form B-6 Interlock
24131	Screw fastening Nos. 46838, 46839 to blow-out coil support (8-32, $\frac{1}{2}$ " F.H.)
1193	Screw fastening No. 46837 to supporting block (8-32, $\frac{1}{2}$ " F.H.)
46840	Contact stud
44049	Nut for No. 46840 (14-24, Hex. Blued, Cham. one side)
22780	Lock washer for No. 44049 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for No. 46840
46842	Contact disc
46843	Shaft for contact disc, for Form A-1 Interlock
46844	Shaft for contact disc, for Form A-2 Interlock
46845	Shaft for contact discs, for Form A-3 Interlock
46846	Shaft for contact discs, for Form A-4 Interlock
46847	Shaft for contact discs, for Form A-5 Interlock
46848	Shaft for contact discs, for Form B-5 Interlock
46849	Shaft for contact discs, for Form B-6 Interlock
46794	Pressure spring for contact discs

CONTACTORS AND INTERLOCKS

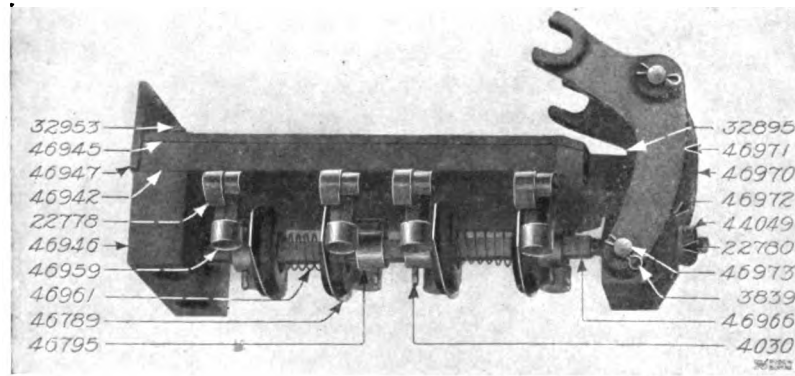
TYPE DI-61, FORMS C-1, C-2, C-3, C-4, C-5, C-7, C-8, C-9 AND D-5 INTERLOCKS
FOR USE WITH TYPE DB61, FORM D CONTACTOR—(Concluded)

Type DI-61, Form D-5 Interlock

Cat. No.	Description
46870	Screw fastening Nos. 46868, 46869 in position (4-36, $\frac{1}{8}$ " F.H.)
46871	Reinforcing block, with rivets and washers for side plates
46872	Screw fastening No. 46867 to side plates (6-32, $\frac{1}{8}$ " F.H.)
8018	Screw fastening side plates to top plate (6-32, $\frac{1}{8}$ " F.H.)
46781	Bearing block for shaft
27898	Screw fastening interlock frame and bearing block in position (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 27898 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46873	BLOW-OUT COIL, complete, for Form D-5 Interlock
40581	Screw fastening blow-out coil connection strip to interlock frame (10-32, $1\frac{1}{4}$ " R.H. Blued)
40582	Lock washer for No. 40581 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.050" Ph. Brz.)
44086	Copper terminal for No. 40581
46874	Nut for No. 40581 (10-32, $\frac{3}{32}$ " Thick, Hex. Cham. both sides)
46785	Contact stud, for Forms C-1, C-2, C-3, C-4, C-5, C-7, C-8, C-9 and short stud for Form D-5 Interlocks
46875	Long contact stud, for Form D-5 Interlock
46876	Insulation for contact studs, for Form D-5 Interlock
46877	Bushing for stud, for Form D-5 Interlock
38937	Washer for contact stud ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for contact stud
22213	Nut for Nos. 46785, 46875 (14-24, Hex. Brass)
22780	Lock washer for No. 22213 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46789	Contact disc
46794	Pressure spring for contact disc
46878	Shaft for contact disc, for Form C-1 Interlock
46879	Shaft for contact disc, for Form C-2 Interlock
46880	Shaft for contact discs, for Form C-3 Interlock
46792	Shaft for contact discs, for Form C-4 Interlock
46791	Shaft for contact discs, for Form C-5 Interlock
46881	Shaft for contact discs, for Form C-7 Interlock
46882	Shaft for contact discs, for Form C-8 Interlock
46883	Shaft for contact discs, for Form C-9 Interlock
46884	Shaft for contact discs, for Form D-5 Interlock
46795	Brass collar for shaft, for Forms C-3, C-5, C-9, D-5 and small collar for Forms C-1, C-2, C-4, C-7 and C-8 Interlocks
46796	Large brass collar for Forms C-1, C-2, C-4, C-7 and C-8 Interlocks
4030	Spring cotter for No. 46795 ($\frac{3}{32}$ "x $\frac{1}{2}$ "
9747	Spring cotter for No. 46796 ($\frac{3}{32}$ "x1")
44049	Adjusting nut for shaft (14-24, Hex. Blued, Cham. one side)
22780	Lock washer for No. 44049 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46885	Operating lever
46886	Insulating connector for operating lever and shaft
46887	Pin for Nos. 46885, 46886 ($\frac{1}{4}$ "x1 $\frac{1}{8}$ "
3839	Spring cotter for No. 46887 ($\frac{3}{32}$ "x $\frac{1}{2}$ "

CONTACTORS AND INTERLOCKS

**TYPE DI-91, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-9 AND B-5 INTERLOCKS
FOR USE WITH TYPE DB91, FORM D CONTACTOR**

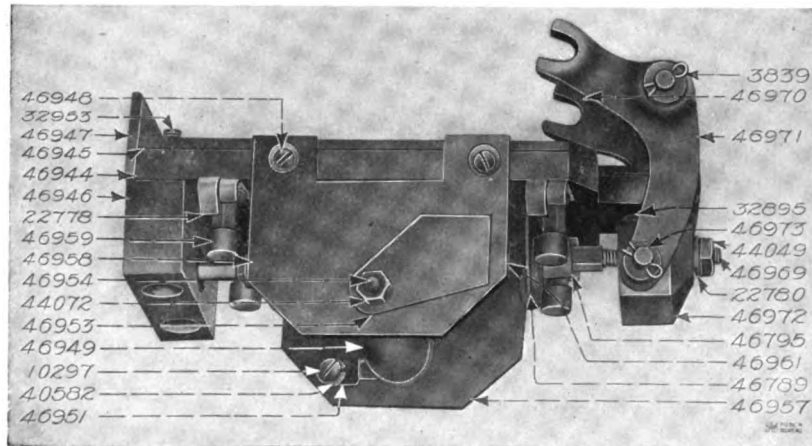


NOTE: The above illustration of the Type DI-91, Form A-5 Interlock is representative of Forms A-1, A-2, A-3, A-4, A-7 and A-9. The difference being in the number and position of the contact discs.

Cat. No.

Description

46939	INTERLOCK BASE, for Forms A-1 and A-2 Interlocks
46940	Interlock base, for Form A-3 Interlock
46941	Interlock base, for Form A-4 Interlock
46942	Interlock base, for Forms A-5 and A-9 Interlocks
46943	Interlock base, for Form A-7 Interlock
46944	Interlock base, for Form B-5 Interlock
46945	Insulation for base
46946	Bearing block for shaft
32895	Screw fastening interlock base and insulation in position (14-24, $\frac{1}{4}$ " F.H. Blued)
32953	Screw fastening bearing block, interlock base and insulation in position (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 32953 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060")
46947	End shield
46948	Screw fastening No. 46947 to interlock base (No. 6, $\frac{1}{4}$ " F.H.)
46949	BLOW-OUT COIL, for Form B-5 Interlock
46950	Connection strip for blow-out coil and contact stud
46951	Connection strip for blow-out coil and terminal
44086	Copper terminal for No. 46951
10297	Screw fastening No. 44086 in position (10-32, $\frac{1}{8}$ " R.H. Blued)
46952	Nut for No. 10297 (10-32, Hex. Cham. both sides)
40582	Lock washer for No. 10297 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .044")
46953	POLE PIECE, two parts, with blow-out coil core and nuts for Form B-5 Interlock
46954	Blow-out coil core (10-32, $3\frac{1}{2}$ " Long)
44072	Nut for No. 46954 (10-32, Hex. Cham. one side)
46955	Insulation sleeve for No. 46954
45163	Washer for No. 46955 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x $\frac{1}{16}$ " Thick Fiber)
46956	Washer for No. 46955 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x $\frac{1}{16}$ " Thick Mica)
46957	Support for blow-out coil (right-hand)
46958	Support for blow-out coil (left-hand)
46948	Screw fastening support to interlock base (No. 6, $\frac{1}{4}$ " F.H.)
46959	Contact stud
22780	Lock washer for No. 46959 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060")
22778	Copper terminal for No. 46959
22213	Nut for No. 46959 (14-24, Hex. Brass)
46960	Insulation for contact studs, for Form B-5 Interlock
46789	Contact disc
46961	Pressure spring for contact disc

CONTACTORS AND INTERLOCKS**TYPE DI-91, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-9 AND B-5 INTERLOCKS
FOR USE WITH TYPE DB91, FORM D CONTACTOR—(Concluded)****Type DI-91, Form B-5 Interlock**

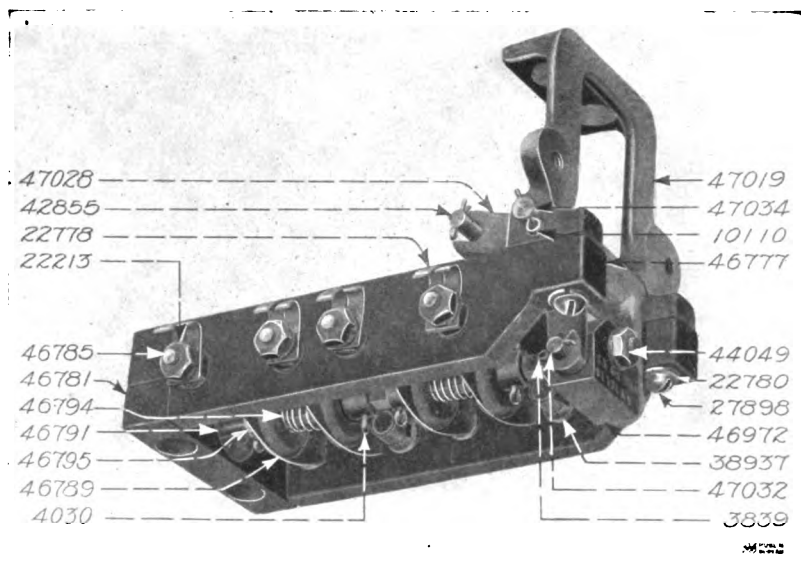
Cat. No.	Description
46962	Shaft for contact disc, for Form A-1 Interlock
46963	Shaft for contact disc, for Form A-2 Interlock
46964	Shaft for contact discs, for Form A-3 Interlock
46965	Shaft for contact discs, for Form A-4 Interlock
46966	Shaft for contact discs, for Form A-5 Interlock
46967	Shaft for contact discs, for Form A-7 Interlock
46968	Shaft for contact discs, for Form A-9 Interlock
46969	Shaft for contact discs, for Form B-5 Interlock
46795	Brass collar for shaft, for Forms A-3, A-5, A-9, B-5 and small collar for Forms A-1, A-2, A-4 and A-7 Interlocks
46796	Large brass collar for Forms A-1, A-2, A-4 and A-7 Interlocks
4030	Spring cotter for No. 46795 ($\frac{3}{8}$ "x $\frac{1}{4}$ ")
9747	Spring cotter for No. 46796 ($\frac{3}{8}$ "x $\frac{1}{4}$ ")
44049	Adjusting nut for shaft (14-24, Hex. Blued, Cham. one side)
22780	Lock washer for No. 44049 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22213	Locking nut for shaft (14-24, Hex. Brass)
46970	Operating lever arm (right-hand)
46971	Operating lever arm (left-hand)
46972	Insulating connector for operating lever arms and shaft
46973	Pin for Nos. 46970, 46971, 46972 ($\frac{1}{4}$ "x $2\frac{1}{8}$ ")
3839	Spring cotter for No. 46973 ($\frac{3}{8}$ "x $\frac{1}{4}$ ")

TYPES DI-131 AND DI-141, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-8, A-9, A-10, A-11, A-13, A-15, A-16, A-17 AND B-5 INTERLOCKS FOR USE WITH TYPES DB131 AND DB141, FORM B CONTACTORS

46855	INTERLOCK FRAME, for Form A-1 Interlock
46856	Interlock frame, for Form A-2 Interlock
46857	Interlock frame, for Form A-3 Interlock
46778	Interlock frame, for Form A-4 Interlock
46777	Interlock frame, for Forms A-5, A-9 and A-10 Interlocks
46776	Interlock frame, for Form A-7 Interlock
46858	Interlock frame, for Form A-11 Interlock
46859	Interlock frame, for Form A-13 Interlock
46860	Interlock frame, for Form A-15 Interlock
46861	Interlock frame, for Form A-16 Interlock
46841	Interlock frame, for Form A-17 Interlock

CONTACTORS AND INTERLOCKS

TYPES DI-131 AND DI-141, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-8, A-9, A-10, A-11, A-13, A-15, A-16, A-17 AND B-5 INTERLOCKS FOR USE WITH TYPES DB131 AND DB141, FORM B CONTACTORS—(Continued)

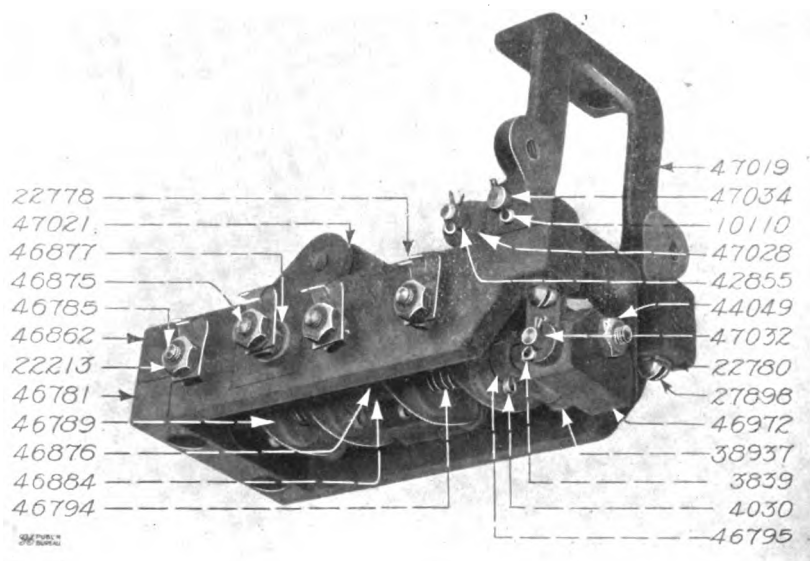


NOTE: The above illustration of the Type DI-131, Form A-5 Interlock is representative of Types DI-131 and DI-141, Forms A-1, A-2, A-3, A-4, A-7, A-8, A-9, A-10, A-11, A-13, A-15, A-16 and A-17. The principal difference being in the number and position of the contact discs.

Cat. No.	Description
46862	Interlock frame, for Form B-5 Interlock
47018	Interlock frame, complete, for Type DI-131, Form A-8, Interlock, for use with Type DB131 Form B Contactor only
46864	Side plate (right-hand)
46865	Side plate (left-hand)
47037	Top plate
46867	Bearing block, complete, for shaft
46868	Bearing plate, with drilled hole
46869	Bearing plate, with tapped hole
46870	Screw fastening Nos. 46868, 46869 in position (4-36, $\frac{1}{8}$ " F.H.)
46871	Reinforcing block, with rivets and washers for side plates
46872	Screw fastening No. 46867 to side plates (6-32, 1" F.H.)
8018	Screw fastening side plates to top plate (6-32, $\frac{1}{8}$ " F.H.)
47019	Supporting bracket for Type DI131 Interlocks
47020	Supporting bracket for Type DI141 Interlocks
46781	Bearing block, for shaft
27898	Screw fastening interlock frame and bearing block in position (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 27898 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
47021	BLOW-OUT COIL, complete, for Form B-5 Interlock
40581	Screw fastening blow-out coil connection strip to interlock frame (10-32, $1\frac{1}{4}$ " R.H. Blued)
40582	Lock washer for No. 40581 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.044")
44086	Copper terminal for No. 40581
46874	Nut for No. 40581 (10-32, $\frac{3}{8}$ " Thick, Hex. Cham. both sides)
46785	Contact stud, for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-8, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and short stud for Form B-5 Interlocks
46875	Long contact stud for Form B-5 Interlock
46876	Insulation for contact studs, for Form B-5 Interlock
46877	Bushing for stud, for Form B-5 Interlock
38937	Washer for contact stud ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for contact stud
22213	Nut for Nos. 46785, 46875 (14-24, Hex. Brass)
22780	Lock washer for No. 22213 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46789	CONTACT DISC
46794	Pressure spring for contact disc

CONTACTORS AND INTERLOCKS

TYPES DI-131 AND DI-141, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-8, A-9, A-10, A-11, A-13, A-15, A-16, A-17 AND B-5 INTERLOCKS FOR USE WITH TYPES DB131 AND DB141, FORM B CONTACTORS—(Concluded)

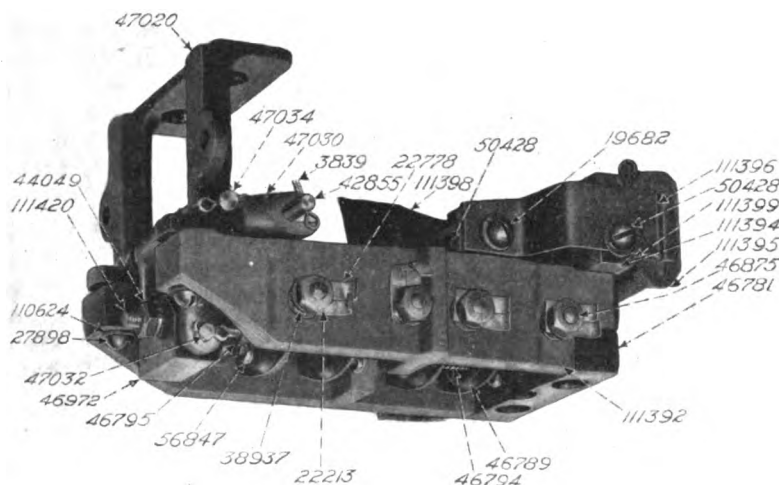


Type DI-131, Form B-5 Interlock

Cat. No.	Description
46878	Shaft for contact disc, for Form A-1 Interlock
46879	Shaft for contact disc, for Form A-2 Interlock
46880	Shaft for contact discs, for Form A-3 Interlock
46792	Shaft for contact discs, for Form A-4 Interlock
46791	Shaft for contact discs, for Form A-5 Interlock
46790	Shaft for contact discs, for Form A-7 Interlock
46882	Shaft for contact discs, for Form A-8 Interlock
46883	Shaft for contact discs, for Form A-9 Interlock
47022	Shaft for contact discs, for Form A-10 Interlock
47023	Shaft for contact discs, for Form A-11 Interlock
47024	Shaft for contact discs, for Form A-13 Interlock
47025	Shaft for contact disc, for Form A-15 Interlock
47026	Shaft for contact disc, for Form A-16 Interlock
47027	Shaft for contact discs, for Form A-17 Interlock
46884	Shaft for contact discs, for Form B-5 Interlock
46795	Brass collar for shaft, for Forms A-3, A-5, A-9, A-10, A-17, B-5 and small collar for Forms A-1, A-2, A-4, A-7, A-8, A-11, A-13, A-15, and A-16 Interlocks
46796	Large brass collar for shaft, for Forms A-1, A-2, A-4, A-7, A-8, A-11, A-13, A-15 and A-16 Interlocks
4030	Spring cotter for No. 46795 ($\frac{3}{8}$ "x $\frac{1}{2}$ ")
9747	Spring cotter for No. 46796 ($\frac{3}{8}$ "x1")
44049	Adjusting nut for shaft (14-24, Hex. Blued Cham. one side)
22780	Lock washer for No. 44049 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22213	Locking nut for shaft (14-24, Hex. Brass)
47028	Operating lever for Type DI131, Forms A-1, A-2, A-3, A-4, A-5, A-7, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and B-5 Interlocks
47029	Operating lever for Type DI131, Form A-8 Interlock
47030	Operating lever for Type DI141, Forms A-1, A-2, A-3, A-4, A-5, A-7, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and B-5 Interlocks
46972	Insulating connector for operating lever and shaft, for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and B-5 Interlocks
47031	Insulating connector for operating lever and shaft, for Form A-8 Interlock
47032	Pin for operating lever and insulating connector for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and B-5 Interlocks ($\frac{1}{8}$ "x $2\frac{1}{4}$ " Tob. Brz.)
47033	Pin for operating lever and insulating connector for Form A-8 Interlock ($\frac{1}{8}$ "x $1\frac{3}{4}$ " Brass)
47034	Pin for operating lever and supporting bracket for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-9, A-10, A-11, A-13, A-15, A-16, A-17 and B-5 Interlocks ($\frac{1}{8}$ "x $3\frac{1}{4}$ " Tob. Brz.)
47035	Pin for operating lever and supporting bracket, for Form A-8 Interlock ($\frac{1}{8}$ "x $3\frac{1}{4}$ ")
42855	Pin for operating lever and contactor contact lever ($\frac{1}{8}$ "x $2\frac{1}{4}$ ")
89404	Spring cotter for No. 47033 ($\frac{1}{8}$ "x $\frac{1}{2}$ ")
10110	Spring cotter for Nos. 47034, 47035 ($\frac{1}{8}$ "x $\frac{1}{2}$ ")
3839	Spring cotter for Nos. 47032, 42885 ($\frac{1}{8}$ "x $\frac{1}{2}$ ")

CONTACTORS AND INTERLOCKS

TYPES DI-131 AND DI-141, FORMS J-1, J-2, J-3, J-4, J-5, J-7, J-9, J-10, J-13, J-15, J-16, J-17, J-18, J-19, J-20, J-21, J-24, J-27 AND H-5 INTERLOCKS FOR USE WITH TYPES DB131 AND DB141, FORM B CONTACTORS



Type DI-141, Form H-5 Interlock

Cat. No.	Description
111391	INTERLOCK FRAME for Forms J-1, J-2, J-3, J-4, J-5, J-7, J-9, J-10, J-13, J-15, J-16, J-17, J-18, J-19, J-20, J-21, J-24 and J-27 Interlocks
111392	Interlock frame for Form H-5 Interlock
46294	Supporting bracket for Type DI-131, Forms J-1, J-2, J-3, J-4, J-5, J-7, J-9, J-10, J-13, J-15, J-16, J-17, J-18, J-19, J-20, J-21, J-24 and J-27 Interlocks
47097	Supporting bracket for Type DI-141, Forms J-1, J-2, J-3, J-4, J-5, J-7, J-9, J-10, J-13, J-15, J-16, J-17, J-18, J-19, J-20, J-21, J-24 and J-27 Interlocks
111393	Insulation blocks with supporting bracket, for Type DI-131, Form H-5 Interlock
111394	Insulation blocks with supporting bracket, for Type DI-141, Form H-5 Interlock
11096	Screw fastening Nos. 46294, 47097 to contactor (14-24, $\frac{1}{4}$ " R.H. Blued)
50428	Screw fastening Nos. 111393, 111394 to contactor (14-24, $\frac{1}{4}$ " R.H. Blued)
110624	Positive lock washer for Nos. 11096, 50428 ($\frac{3}{8}$ " x $\frac{1}{8}$ " x $\frac{3}{4}$ " Thick)
47019	Supporting bracket for interlock and contactor arc chute, for Type DI-131 Interlock
47020	Supporting bracket for interlock and contactor arc chute, for Type DI-141 Interlock
46781	Bearing block for shaft
27898	Screw fastening interlock frame and bearing block in position (14-24, $1\frac{1}{4}$ " R.H. Blued)
110624	Positive lock washer for No. 27898 ($\frac{3}{8}$ " x $\frac{1}{8}$ " x $\frac{3}{4}$ " Thick)
111395	BLOW-OUT COIL, complete, with leads and terminals, for Form H-5 Interlock
46788	Copper terminal for blow-out coil lead
111396	Pole piece, right-hand
111397	Pole piece, left-hand
111398	Insulation shield for No. 111397
50428	Screw fastening Nos. 111396, 111397, 111398 to insulation blocks (14-24, $\frac{1}{4}$ " R.H. Blued)
19682	Screw fastening Nos. 111396, 111397, 111398 to interlock frame (14-24, $\frac{1}{4}$ " R.H. Blued)
110624	Positive lock washer for Nos. 50428, 19682 ($\frac{3}{8}$ " x $\frac{1}{8}$ " x $\frac{3}{4}$ " Thick)
111399	Insulation shield between blow-out coil and supporting bracket
10076	Screw fastening No. 111399 to insulation blocks (10-32, $\frac{1}{4}$ " F.H.)
46875	Contact stud
111400	Connection strip for contact studs ($1\frac{1}{2}$ " between centers of holes)
111401	Connection strip for contact studs ($1\frac{1}{2}$ " between centers of holes)
38937	Washer for contact stud ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060")
22778	Copper terminal, right-hand, for contact stud
46788	Copper terminal, left-hand, for contact stud
22213	Nut for contact stud (14-24, Hex. Flat Brass)
110624	Positive lock washer for No. 22213 ($\frac{3}{8}$ " x $\frac{1}{8}$ " x $\frac{3}{4}$ " Thick)
46789	Contact disc
46794	Pressure spring for contact discs
111402	Shaft (Stamped J-1) for contact disc, for Form J-1 Interlock
111403	Shaft (Stamped J-2) for contact disc, for Form J-2 Interlock

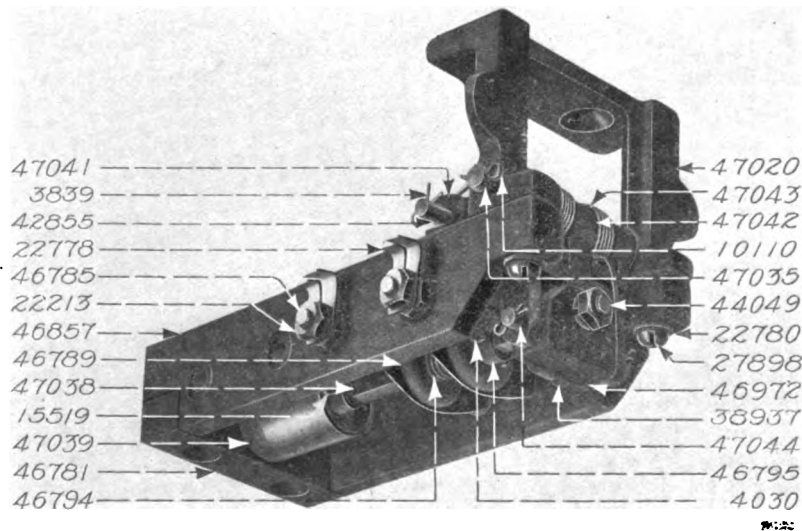
CONTACTORS AND INTERLOCKS

TYPES DI-131 AND DI-141, FORMS J-1, J-2, J-3, J-4, J-5, J-7, J-9, J-10, J-13, J-15, J-16, J-17, J-18, J-19, J-20, J-21, J-24, J-27 AND H-5 INTERLOCKS FOR USE WITH TYPES DB131 AND DB141, FORM B CONTACTORS—(Concluded)

Cat. No.	Description
111404	Shaft (Stamped J-3) for contact discs, for Form J-3 Interlock
111405	Shaft (Stamped J-4) for contact discs, for Form J-4 Interlock
111406	Shaft (Stamped J-5) for contact discs, for Form J-5 Interlock
111407	Shaft (Stamped J-7) for contact discs, for Form J-7 Interlock
111408	Shaft (Stamped J-9) for contact discs, for Form J-9 Interlock
111409	Shaft (Stamped J-10) for contact discs, for Form J-10 Interlock
111410	Shaft (Stamped J-13) for contact discs, for Form J-13 Interlock
111411	Shaft (Stamped J-15) for contact disc, for Form J-15 Interlock
111412	Shaft (Stamped J-16) for contact disc, for Form J-16 Interlock
111413	Shaft (Stamped J-17) for contact discs, for Form J-17 Interlock
111414	Shaft (Stamped J-18) for contact discs, for Form J-18 Interlock
111415	Shaft (Stamped J-19) for contact discs, for Form J-19 Interlock
111416	Shaft (Stamped J-20) for contact discs, for Form J-20 Interlock
111417	Shaft (Stamped J-21) for contact discs, for Form J-21 Interlock
111418	Shaft (Stamped J-24) for contact discs, for Form J-24 Interlock
111419	Shaft (Stamped J-27) for contact discs, for Form J-27 Interlock
111420	Shaft (Stamped H-5) for contact discs, for Form H-5 Interlock
46795	Brass collar for shaft, for Forms J-3, J-5, J-9, J-10, J-17, J-19, J-20, J-21, J-24 and H-5 and small collar for Forms J-1, J-2, J-4, J-7, J-13, J-15, J-16, J-18 and J-27 Interlocks
46796	Large brass collar for shaft for Forms J-1, J-2, J-4, J-7, J-13, J-15, J-16, J-18 and J-27 Interlocks
56847	Spring cotter for No. 46795 ($\frac{1}{8}$ "x $\frac{3}{8}$ ")
16076	Spring cotter for No. 46796 ($\frac{1}{8}$ "x1")
44049	Adjusting nut for shaft (14-24, $\frac{1}{16}$ " thick, $\frac{1}{2}$ " across flats, Hex. Blued Cham. one side)
110624	Positive lock washer for No. 44049 ($\frac{3}{16}$ "x $\frac{1}{8}$ "x $\frac{3}{16}$ " Thick)
22213	Locking nut for shaft (14-24, Hex. Flat Brass)
47028	Operating lever for Type DI131 Interlocks
47030	Operating lever for Type DI141 Interlocks
46972	Insulating connector for operating lever and shaft
47032	Pin for operating lever and insulating connector ($\frac{1}{4}$ "x2 $\frac{1}{8}$ " Tobin Bronze)
47034	Pin for operating lever and supporting bracket ($\frac{5}{16}$ "x3 $\frac{1}{4}$ " Tobin Bronze)
42855	Pin for operating lever and contactor contact lever ($\frac{1}{4}$ "x2 $\frac{1}{8}$ ")
3839	Spring cotter for Nos. 47032, 42855 ($\frac{3}{16}$ "x $\frac{3}{8}$ ")
10110	Spring cotter for No. 47034 ($\frac{3}{16}$ "x $\frac{1}{2}$ ")

TYPE DI-141, FORM E-3 INTERLOCK FOR USE WITH TYPE DB141, FORM B CONTACTOR

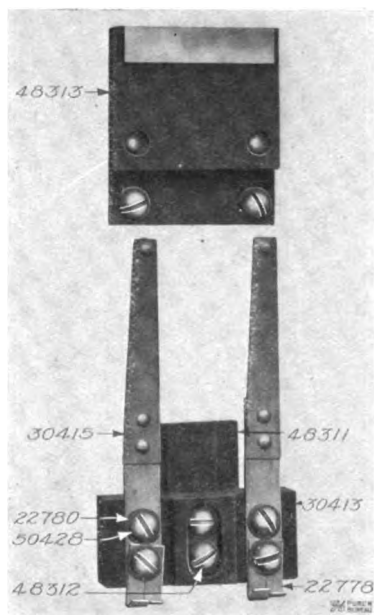
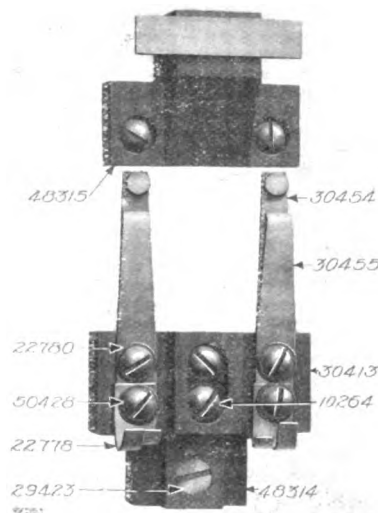
46857	INTERLOCK FRAME
47020	Supporting bracket for interlock
46781	Bearing block for shaft
27898	Screw fastening interlock frame and bearing block in position (14-24, 1 $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 27898 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46785	Contact stud
38937	Washer for contact stud ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for contact stud
22213	Nut for contact stud (14-24, Hex. Brass)
22780	Lock washer for No. 22213 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
46789	Contact disc
46794	Pressure spring for contact disc
47038	Shaft for contact disc
46795	Brass collar, for shaft
4030	Spring cotter for No. 46795 ($\frac{3}{16}$ "x $\frac{3}{8}$ ")
47039	DASHPOT, complete, with plunger and spring cotter
15519	Spring cotter for dashpot plunger and shaft ($\frac{3}{16}$ "x $\frac{3}{8}$ ")
47040	Cap screw fastening dashpot in position (14-24, $\frac{1}{2}$ " Hex. H.)
44049	Adjusting nut for shaft (14-24, Hex. Blued, Cham. one side)
22780	Lock washer for Nos. 47040, 44049 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22213	Locking nut for shaft (14-24, Hex. Brass)
47041	Operating lever
47042	Operating lever arm

CONTACTORS AND INTERLOCKS**TYPE DI-141, FORM E-3 INTERLOCK FOR USE WITH TYPE DB141
FORM B CONTACTOR—(Concluded)****Type DI-141, Form E-3 Interlock**

Cat. No.	Description
47043	Spring for Nos. 47041, 47042
46972	Insulating connector for operating lever arm and shaft
47044	Pin for operating lever arm and insulating connector ($\frac{1}{8}$ "x $2\frac{1}{8}$ ")
47035	Pin for Nos. 47041, 47042 and supporting bracket ($\frac{3}{16}$ "x $3\frac{1}{4}$ ")
42855	Pin for operating lever and contactor contact lever ($\frac{1}{4}$ "x $2\frac{1}{8}$ ")
3839	Spring cotter for Nos. 47044, 42855 ($\frac{3}{16}$ "x $\frac{3}{8}$ ")
10110	Spring cotter for No. 47035 ($\frac{3}{16}$ "x $\frac{1}{2}$ ")

**FORM 1 INTERLOCK FOR USE WITH TYPE DB141
FORM D CONTACTOR**

30413	CONTACT BLOCK
48311	Support for contact block
48312	Screw fastening contact block and support to contactor mechanism plate (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 48312 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
30415	Contact finger, complete
30416	Contact finger, with contact tip and rivets
50428	Screw fastening No. 30415 to contact block (14-24, $\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")
22778	Copper terminal for contact finger
48313	Contact support, with contact
50428	Screw fastening No. 48313, to contactor contact lever (14-24, $\frac{1}{2}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x.060")

CONTACTORS AND INTERLOCKS**INTERLOCKS FOR USE WITH TYPE DB141, FORM D CONTACTOR****Form 1 Interlock****Form 2 Interlock****FORM 2 INTERLOCK FOR USE WITH TYPE DB141, FORM D CONTACTOR**

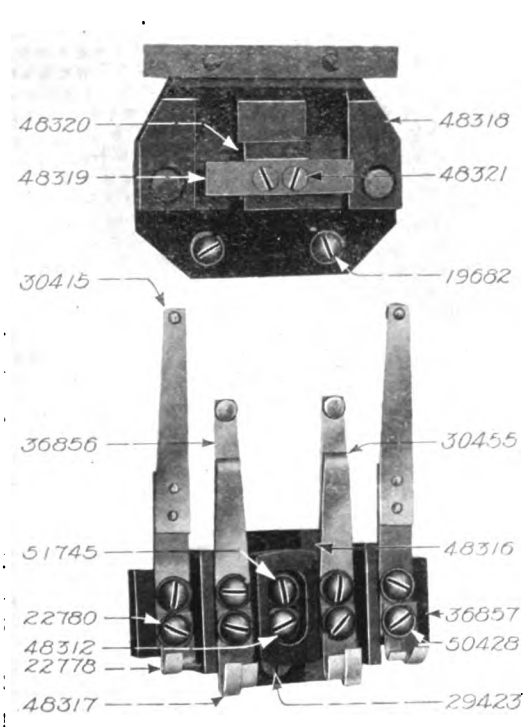
Cat. No.	Description
30413	CONTACT BLOCK
48314	Support for contact block
29423	Screw fastening support to contactor mechanism plate (14-24, 1 1/4" F.H.)
10264	Screw fastening contact block to support (14-24, 1" R.H. Blued)
22780	Lock washer for No. 10264 (1 1/4"x1/2"x.060")
30454	Contact finger with contact tip
30455	Contact finger stop
50428	Screw fastening Nos. 30454, 30455 to contact block (14-24, 1/2" R.H. Blued)
22780	Lock washer for No. 50428 (1 1/4"x1/2"x.060")
22778	Copper terminal for contact finger
48315	Contact support with contact
50428	Screw fastening No. 48315 to contactor contact lever (14-24, 1/2" R.H. Blued)
22780	Lock washer for No. 50428 (1 1/4"x1/2"x.060")

FORM 3 INTERLOCK FOR USE WITH TYPE DB141, FORM D CONTACTOR

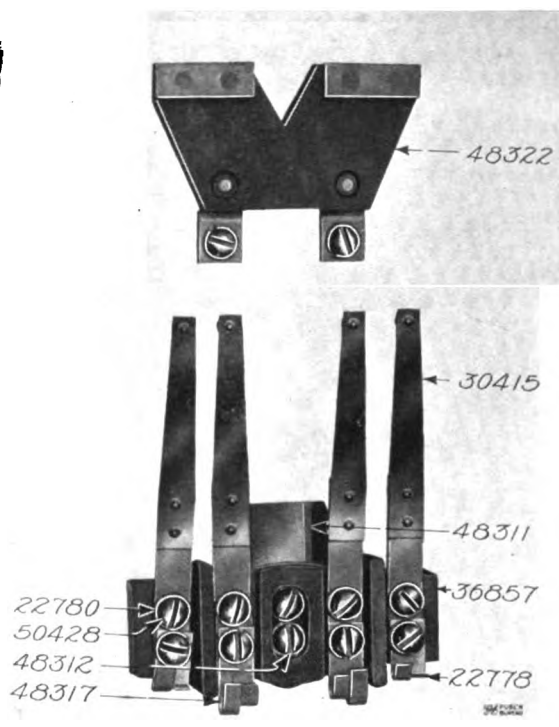
36857	CONTACT BLOCK
48316	Support for contact block
29423	Short screw fastening support to contactor mechanism plate (14-24, 1 1/4" F.H.)
51745	Short screw fastening contact block to support (14-24, 3/4" R.H. Blued)
48312	Long screw fastening contact block and support to contactor mechanism plate (14-24, 1 1/4" R.H. Blued)
22780	Lock washer for Nos. 51745, 48312 (1 1/4"x1/2"x.060")
30415	Long contact finger, complete
30416	Contact finger, with contact tip and rivets
36856	Short contact finger, with contact tip
30455	Contact finger stop
50428	Screw fastening Nos. 30415, 36856, 30455 to contact block (14-24, 1/2" R.H. Blued)
22780	Lock washer for No. 50428 (1 1/4"x1/2"x.060")
22778	Short copper terminal for contact block

CONTACTORS AND INTERLOCKS

INTERLOCKS FOR USE WITH TYPE DB141, FORM D CONTACTOR—(Concluded)



Form 3 Interlock



Form 4 Interlock

FORM 3 INTERLOCK FOR USE WITH TYPE DB141, FORM D CONTACTOR—(Concluded)

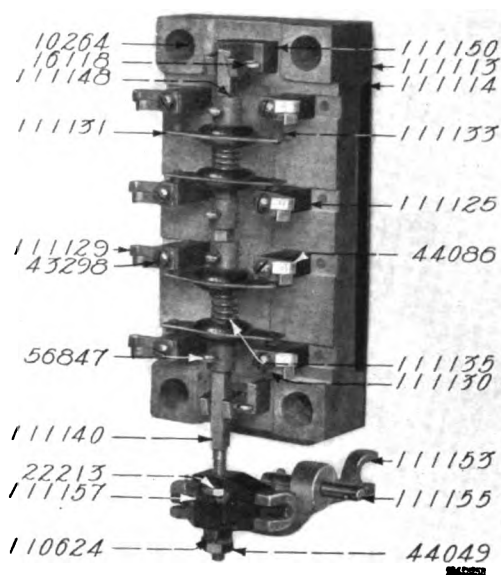
Cat. No.	Description
48317	Long copper terminal for contact block
48318	Contact support with contacts
48319	Brass contact
48320	Support for brass contact
48321	Screw fastening Nos. 48319, 48320 to contact support (10-32, $\frac{1}{4}$ " F.H.)
19682	Screw fastening No. 48318 to contact contact lever (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 19682 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")

FORM 4 INTERLOCK FOR USE WITH TYPE DB141, FORM D CONTACTOR

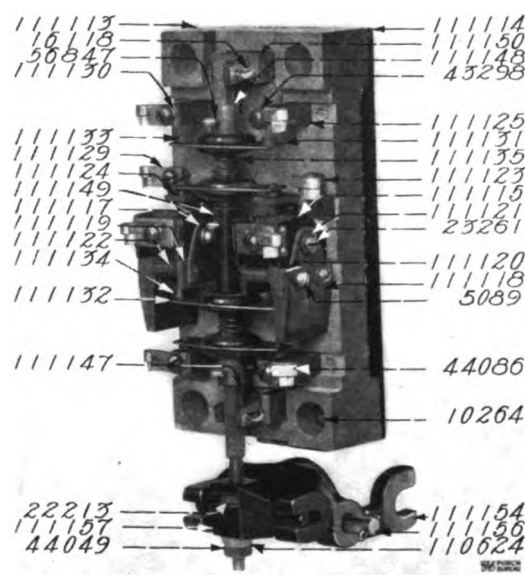
36857	CONTACT BLOCK
48311	Support for contact block
48312	Screw fastening contact block and support to contactor mechanism plate (14-24, $1\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 48312 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
30415	Contact finger, complete
30416	Contact finger, with contact tip and rivets
50428	Screw fastening No. 30415 to contact block (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")
22778	Short copper terminal for contact finger
48317	Long copper terminal for contact finger
48322	Contact support with contacts
50428	Screw fastening No. 48322 to contactor contact lever (14-24, $\frac{1}{4}$ " R.H. Blued)
22780	Lock washer for No. 50428 ($\frac{1}{4}$ "x $\frac{1}{4}$ "x.060")

CONTACTORS AND INTERLOCKS

TYPES DI-160 AND DI-166, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-18, A-20, A-24, A-25, A-27 AND B-5 INTERLOCKS



DI-160-A-5 Interlock



DI-166-B-5 Interlock

NOTE. Type DI-160 Interlocks are for use with Type DB160, Forms A and D Contactors.
Type DI-166 Interlocks are for use with Type DB166, Forms A and B Contactors.

Cat. No.	Description
111113	INTERLOCK FRAME
10264	Screw fastening interlock frame in position (14-24, 1" R.H. Blued)
110624	Positive lock washer for No. 10264 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x $\frac{1}{4}$ " Thick)
110789	Washer for No. 10264 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x .014")
111114	Insulation plate between interlock frame and contactor
111115	BLOW-OUT COIL, complete, for Form B-5 Interlock
111117	Inside pole piece with pins, for blow-out coil
111118	Outside pole piece, for blow-out coil
111119	Barrier between inside pole piece and contact post
111120	Barrier between outside pole piece and contact post
5089	Screw fastening pole pieces to blow-out coil core (8-32, $\frac{1}{4}$ " R.H. Blued)
23261	Screw fastening Nos. 111118, 111120 to contact post (8-32, $\frac{1}{4}$ " R.H. Brass)
111121	Positive lock washer for Nos. 23261, 5089 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x $\frac{1}{4}$ " Thick)
111122	Contact post for blow-out coil, for Form B-5 Interlock
111123	Inside contact post, right-hand, for Form B-5 Interlock
111124	Inside contact post, left-hand, for Form B-5 Interlock
111125	Contact post for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-18, A-20, A-24, A-25 and A-27 Interlocks and outside contact post for Form B-5 Interlock
17398	Screw fastening No. 111122 in position (12-24, $\frac{1}{4}$ " R.H. Brass)
49281	Screw fastening Nos. 111123, 111124, 111125 in position (12-24, $\frac{1}{4}$ " R.H. Blued)
111126	Positive lock washer for Nos. 17398, 49281 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x $\frac{1}{4}$ " Thick)
17399	Washer for Nos. 17398, 49281 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x .014")
111127	Connection strip for contact posts ($1\frac{1}{2}$ " between centers of holes)
111128	Connection strip for contact posts ($1\frac{1}{2}$ " between centers of holes)
44086	Copper terminal, right-hand, for contact posts and blow-out coils
111129	Copper terminal, left-hand, for contact posts and blow-out coils
43298	Screw fastening terminals in position (10-32, $\frac{1}{4}$ " R.H. Blued)
111130	Positive lock washer for No. 43298 ($\frac{1}{2}$ " x $\frac{1}{4}$ " x $\frac{1}{4}$ " Thick)
111131	CONTACT DISC, complete, with contact tips, for Forms A-1, A-2, A-3, A-4, A-5, A-7, A-18, A-20, A-24, A-25 and A-27 Interlocks and contact disc with small contact tips, for Form B-5 Interlock

CONTACTORS AND INTERLOCKS

TYPES DI-160 AND DI-166, FORMS A-1, A-2, A-3, A-4, A-5, A-7, A-18, A-20, A-24, A-25, A-27
AND B-5 INTERLOCKS—(Concluded)

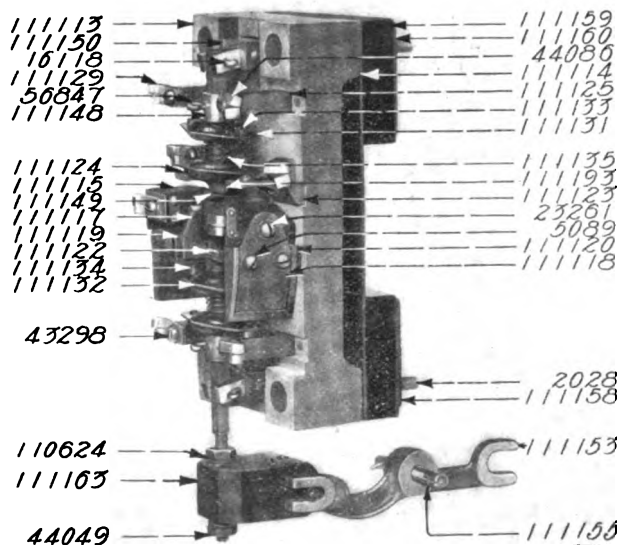
Cat. No.	Description
111132	Contact disc, complete, with large contact tips, for Form B-5 Interlock
111133	Contact tip for No. 111131
111134	Contact tip for No. 111132
111135	Pressure spring for contact discs (Ph. Bronze Wire)
111136	Shaft (Stamped A-1) for contact disc, for Form A-1 Interlock
111137	Shaft (Stamped A-2) for contact disc, for Form A-2 Interlock
111138	Shaft (Stamped A-3) for contact discs, for Form A-3 Interlock
111139	Shaft (Stamped A-4) for contact discs, for Form A-4 Interlock
111140	Shaft (Stamped A-5) for contact discs, for Form A-5 Interlock
111141	Shaft (Stamped A-7) for contact discs, for Form A-7 Interlock
111142	Shaft (Stamped A-18) for contact discs, for Form A-18 Interlock
111143	Shaft (Stamped A-20) for contact discs, for Form A-20 Interlock
111144	Shaft (Stamped A-24) for contact discs, for Form A-24 Interlock
111145	Shaft (Stamped A-25) for contact discs, for Form A-25 Interlock
111146	Shaft (Stamped A-27) for contact discs, for Form A-27 Interlock
111147	Shaft (Stamped B-5) for contact discs, for Form B-5 Interlock
111148	Brass collar for shaft, for Forms A-3, A-5, A-20, A-24, A-25 and B-5, and large collar for Forms A-1, A-2, A-4, A-7, A-18 and A-27 Interlocks
46796	Small brass collar for shaft, for Forms A-1, A-2, A-4, A-7 and A-18 Interlocks
46795	Small brass collar for shaft, for Form A-27 Interlock
111149	Fiber sleeve for shaft, for Form B-5 Interlock
56847	Spring cotter for Nos. 111148, 46795, 111149 ($\frac{1}{8}$ "x $\frac{5}{8}$ ")
16076	Spring cotter for No. 46796 ($\frac{1}{8}$ "x1")
111150	Bracket with operating link for shaft
16118	Spring cotter for link and shaft ($\frac{1}{8}$ "x $\frac{3}{4}$ ")
32815	Screw fastening No. 111150 in position (12-24, $\frac{5}{8}$ " R.H. Blued)
111126	Positive lock washer for No. 32815 ($\frac{3}{32}$ "x $\frac{11}{32}$ "x $\frac{3}{4}$ " Thick)
17399	Washer for No. 32815 ($\frac{11}{32}$ "x $\frac{1}{4}$ "x.014")
111153	OPERATING LEVER, for Type DI-160 Interlocks
111154	Operating lever for Type DI-166 Interlocks
111155	Pin for No. 111153 and contactor bracket ($\frac{1}{16}$ "x1 $\frac{1}{8}$ " Tobin Bronze)
111156	Pin for No. 111154 and contactor bracket ($\frac{1}{16}$ "x1 $\frac{1}{8}$ ")
10110	Spring cotter for Nos. 111155, 111156 ($\frac{5}{16}$ "x $\frac{1}{2}$ ")
111157	Insulating crosshead with pin, for shaft
44049	Adjusting nut for shaft (14-24, $\frac{1}{4}$ " Thick, $\frac{1}{2}$ " across flats, Hex. Blued Cham. one side)
110624	Positive lock washer for No. 44049 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
22213	Locking nut for shaft (14-24, Hex. Flat Brass)

TYPES DI-160 AND DI-166, FORMS C-1, C-2, C-3, C-4, C-5, C-7, C-18, C-20, C-24, C-25, C-27
AND D-5 INTERLOCKS

NOTE: Type DI-160 Interlocks are for use with Type DB160, Forms A and D Contactors.
Type DI-166 Interlocks are for use with Type DB166, Forms A and B Contactors.

111113	INTERLOCK FRAME
111158	Supporting plate for interlock
2028	Screw fastening No. 111158 to contactor (14-24, $\frac{1}{2}$ " F.H.)
111159	Insulation block for interlock
111160	Insulation plate between supporting plate and insulation block
11096	Screw fastening insulation block to supporting plate (14-24, $\frac{5}{8}$ " R.H. Blued)
110624	Positive lock washer for No. 11096 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
111114	Insulation plate between interlock frame and insulation blocks
19879	Screw fastening interlock frame to insulation blocks (14-24, $\frac{1}{4}$ " R.H. Blued)
110624	Positive lock washer for No. 19879 ($\frac{3}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
110789	Washer for No. 19879 ($\frac{11}{32}$ "x $\frac{1}{4}$ "x.014")
111115	BLOW-OUT COIL, complete, for Form D-5 Interlock
111117	Inside pole piece, with pins, for blow-out coil
111118	Outside pole piece, for blow-out coil
111119	Barrier between inside pole piece and contact post
111120	Barrier between outside pole piece and contact post
23261	Screw fastening pole pieces to blow-out coil core (8-32, $\frac{1}{2}$ " R.H. Blued)
5089	Screw fastening Nos. 111118, 111120 to contact post (8-32, $\frac{1}{2}$ " R.H. Brass)
111121	Positive lock washer for Nos. 23261, 5089 ($\frac{11}{32}$ "x $\frac{1}{8}$ "x $\frac{3}{4}$ " Thick)
111122	Contact post for blow-out coil, for Form D-5 Interlock
111123	Inside contact post, right-hand, for Form D-5 Interlock
111124	Inside contact post, left-hand, for Form D-5 Interlock

CONTACTORS AND INTERLOCKS

TYPES DI-160 AND DI-166, FORMS C-1, C-2, C-3, C-4, C-5, C-7, C-18, C-20, C-24, C-25, C-27
AND D-5 INTERLOCKS—(Continued)

DI-160-D-5 Interlock

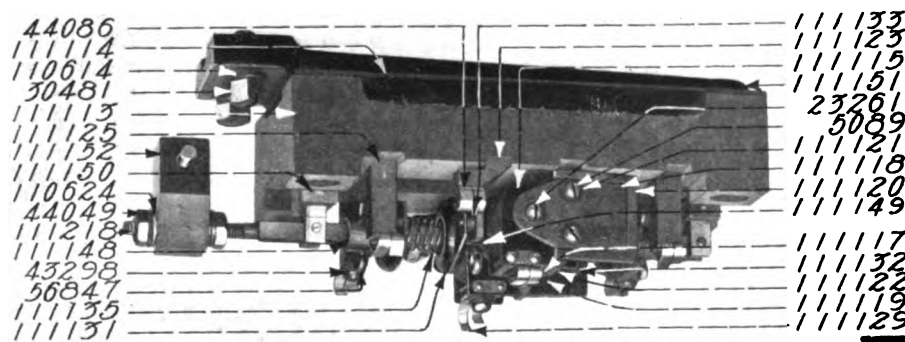
Cat. No.	Description
111125	Contact post for Forms C-1, C-2, C-3, C-4, C-5, C-7, C-18, C-20, C-24, C-25 and C-27 Interlocks and outside contact post for Form D-5 Interlock
17398	Screw fastening No. 111122 in position (12-24, $\frac{3}{4}$ " R.H. Brass)
49281	Screw fastening Nos. 111123, 111124, 111125 in position (12-24, $\frac{3}{4}$ " R.H. Blued)
111126	Positive lock washer for Nos. 17398, 49281 ($\frac{3}{8}$ " x $\frac{1}{4}$ " x $\frac{3}{4}$ " Thick)
17399	Washer for Nos. 17398, 49281 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .014")
111127	Connection strip for contact posts ($1\frac{1}{4}$ " between centers of holes)
111128	Connection strip for contact posts ($1\frac{1}{4}$ " between centers of holes)
44086	Copper terminal, right-hand, for contact posts and blow-out coils
111129	Copper terminal, left-hand, for contact posts and blow-out coils
43298	Screw fastening terminals in position (10-32, $\frac{1}{4}$ " R.H. Blued)
111130	Positive lock washer for No. 43298 ($\frac{3}{8}$ " x $\frac{1}{4}$ " x $\frac{3}{4}$ " Thick)
111131	CONTACT DISC, complete, with contact tips, for Forms C-1, C-2, C-3, C-4, C-5, C-7, C-18, C-20, C-24, C-25 and C-27 Interlocks, and contact disc with small contact tips, for Form D-5 Interlock
111132	Contact disc, complete, with large contact tips, for Form D-5 Interlock
111133	Contact tip for No. 111131
111134	Contact tip for No. 111132
111135	Pressure spring for contact discs (Ph. Bronze Wire)
111182	Shaft (Stamped C-1) for contact disc, for Form C-1 Interlock
111183	Shaft (Stamped C-2) for contact disc, for Form C-2 Interlock
111184	Shaft (Stamped C-3) for contact discs, for Form C-3 Interlock
111185	Shaft (Stamped C-4) for contact discs, for Form C-4 Interlock
111186	Shaft (Stamped C-5) for contact discs, for Form C-5 Interlock
111187	Shaft (Stamped C-7) for contact discs, for Form C-7 Interlock
111188	Shaft (Stamped C-18) for contact discs, for Form C-18 Interlock
111189	Shaft (Stamped C-20) for contact discs, for Form C-20 Interlock
111190	Shaft (Stamped C-24) for contact discs, for Form C-24 Interlock
111191	Shaft (Stamped C-25) for contact discs, for Form C-25 Interlock
111192	Shaft (Stamped C-27) for contact discs, for Form C-27 Interlock
111193	Shaft (Stamped D-5) for contact discs, for Form D-5 Interlock
111148	Brass collar for shaft, for Forms C-3, C-5, C-20, C-24, C-25 and D-5, and large collar for Forms C-1, C-2, C-4, C-7, C-18 and C-27 Interlocks

CONTACTORS AND INTERLOCKS

TYPES DI-160 AND DI-166, FORMS C-1, C-2, C-3, C-4, C-5, C-7, C-18, C-20, C-24, C-25, C-27 AND D-5 INTERLOCKS—(Concluded)

Cat. No.	Description
46796	Small brass collar for shaft, for Forms C-1, C-2, C-4, C-7 and C-18 Interlocks
46795	Small brass collar for shaft, for Form C-27 Interlock
111149	Fiber sleeve for shaft, for Form D-5 Interlock
56847	Spring cotter for Nos. 111148, 46795, 111149 ($\frac{1}{8}$ "x $\frac{3}{8}$ ")
16076	Spring cotter for No. 46796 ($\frac{1}{8}$ "x1")
111150	Bracket with operating link for shaft
16118	Spring cotter for link and shaft ($\frac{1}{8}$ "x $\frac{3}{4}$ ")
32815	Screw fastening No. 111150 in position (12-24, $\frac{1}{2}$ " R.H. Blued)
111126	Positive lock washer for No. 32815 ($\frac{3}{16}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)
17399	Washer for No. 32815 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.014")
111153	OPERATING LEVER, for Type DI160 Interlocks
111154	Operating lever for Type DI166 Interlocks
111155	Pin for No. 111153 and contactor bracket ($\frac{1}{8}$ "x1 $\frac{1}{8}$ " Tobin Bronze)
111156	Pin for No. 111154 and contactor bracket ($\frac{1}{8}$ "x1 $\frac{1}{8}$ ")
10110	Spring cotter for Nos. 111155, 111156 ($\frac{3}{4}$ "x $\frac{1}{2}$ ")
111163	Insulating crosshead with pin, for shaft
44049	Adjusting nut for shaft (14-24, $\frac{3}{8}$ " Thick, $\frac{1}{2}$ " across flats, Hex. Blued Cham. one side)
110624	Positive lock washer for No. 44049 ($\frac{3}{16}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)

TYPE DI-160, FORMS G-1, G-2, G-3, G-4, G-5, G-7, G-18, G-20, G-24, G-25, G-27, H-5 AND
 TYPE DI-166, FORMS E-1, E-2, E-3, E-4, E-5, E-7, E-18, E-20, E-24,
 E-25, E-27 AND F-5 INTERLOCKS



DI-166-F-5 Interlock

NOTE: Type DI-160 Interlocks are for use with Type DB160, Form C Contactors.
 Type DI-166 Interlocks are for use with Type DB166, Forms C and D Contactors.

111113	INTERLOCK FRAME
111151	Supporting bracket for interlock
30481	Screw fastening No. 111151 to contactor ($\frac{1}{8}$ "-18, 1" Hex. H. Slot. Blued)
110614	Positive lock washer for No. 30481 ($\frac{1}{4}$ "x $\frac{3}{16}$ "x $\frac{3}{4}$ " Thick)
111114	Insulation plate between interlock frame and supporting bracket
10264	Screw fastening interlock frame to supporting bracket (14-24, 1" R.H. Blued)
110624	Positive lock washer for No. 10264 ($\frac{3}{16}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)
110789	Washer for No. 10264 ($\frac{1}{4}$ "x $\frac{1}{8}$ "x.014")
111115	BLOW-OUT COIL, complete, for Type DI160, Form H-5 and Type DI166, Form F-5 Interlocks
111117	Inside pole piece with pins, for blow-out coil
111118	Outside pole piece, for blow-out coil
111119	Barrier between inside pole piece and contact post
111120	Barrier between outside pole piece and contact post
23261	Screw fastening pole pieces to blow-out coil core (8-32, $\frac{1}{2}$ " R.H. Blued)
5089	Screw fastening Nos. 111118, 111120 to contact post (8-32, $\frac{1}{2}$ " R.H. Brass)
111121	Positive lock washer for Nos. 23261, 5089 ($\frac{1}{4}$ "x $\frac{1}{2}$ "x $\frac{3}{4}$ " Thick)
111122	Contact post for blow-out coil, for Type DI160, Form H-5 and Type DI166, Form F-5 Interlocks
111123	Inside contact post, right-hand, for Type DI160, Form H-5 and Type DI166, Form F-5 Interlocks

CONTACTORS AND INTERLOCKS

TYPE DI-160, FORMS G-1, G-2, G-3, G-4, G-5, G-7, G-18, G-20, G-24, G-25, G-27, H-5 AND
TYPE DI-166, FORMS E-1, E-2, E-3, E-4, E-5, E-7, E-18, E-20, E-24
E-25, E-27 AND F-5 INTERLOCKS—(Concluded)

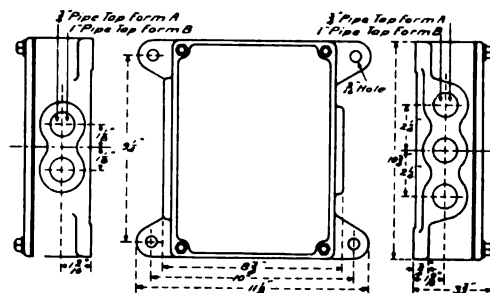
Cat. No.	Description
111124	Inside contact post, left-hand, for Type DI-160, Form H-5 and Type DI-166, Form F-5 Interlocks
111125	Contact post for Type DI-160, Forms G-1, G-2, G-3, G-4, G-5, G-7, G-18, G-20, G-24, G-25, G-27 and Type DI-166, Forms E-1, E-2, E-3, E-4, E-5, E-7, E-18, E-20, E-24, E-25 and E-27 Interlocks, and outside contact post for Type DI-160, Form H-5 and Type DI-166, Form F-5 Interlocks
17398	Screw fastening No. 111122 in position (12-24, $\frac{3}{4}$ " R.H. Brass)
49281	Screw fastening Nos. 111123, 111124, 111125 in position (12-24, $\frac{3}{4}$ " R.H. Blued)
111126	Positive lock washer for Nos. 17398, 49281 ($\frac{3}{32}$ " \times $\frac{1}{16}$ " \times $\frac{3}{4}$ " Thick)
17399	Washer for Nos. 17398, 49281 ($\frac{1}{8}$ " \times $\frac{1}{16}$ " \times .014")
111127	Connection strip for contact posts ($1\frac{1}{8}$ " between centers of holes)
111128	Connection strip for contact posts ($1\frac{1}{8}$ " between centers of holes)
44086	Copper terminal, right-hand, for contact posts and blow-out coils
111129	Copper terminal, left-hand, for contact posts and blow-out coils
43298	Screw fastening terminals in position (10-32, $\frac{1}{4}$ " R.H. Blued)
111130	Positive lock washer for No. 43298 ($\frac{1}{8}$ " \times $\frac{1}{16}$ " \times $\frac{3}{4}$ " Thick)
111131	CONTACT DISC, complete, with contact tips, for Type DI-160, Forms G-1, G-2, G-3, G-4, G-5, G-7, G-18, G-20, G-24, G-25, G-27 and Type DI-166, Forms E-1, E-2, E-3, E-4, E-5, E-7, E-18, E-20, E-24, E-25, E-27 Interlocks, and contact disc with small contact tips, for Type DI-160, Form H-5 and Type DI-166, Form F-5 Interlocks
111132	Contact disc, complete, with large contact tips, for Type DI-160, Form H-5 and Type DI-166, Form F-5 Interlocks
111133	Contact tip for No. 111131
111134	Contact tip for No. 111132
111135	Pressure spring for contact discs (Ph. Bronze wire)
111195	Shaft (Stamped G-1) for contact disc, for Type DI-160, Form G-1 Interlock
111196	Shaft (Stamped G-2) for contact disc, for Type DI-160, Form G-2 Interlock
111197	Shaft (Stamped G-3) for contact discs, for Type DI-160, Form G-3 Interlock
111198	Shaft (Stamped G-4) for contact discs, for Type DI-160, Form G-4 Interlock
111199	Shaft (Stamped G-5) for contact discs, for Type DI-160, Form G-5 Interlock
111200	Shaft (Stamped G-7) for contact discs, for Type DI-160, Form G-7 Interlock
111201	Shaft (Stamped G-18) for contact discs, for Type DI-160, Form G-18 Interlock
111202	Shaft (Stamped G-20) for contact discs, for Type DI-160, Form G-20 Interlock
111203	Shaft (Stamped G-24) for contact discs, for Type DI-160, Form G-24 Interlock
111204	Shaft (Stamped G-25) for contact discs, for Type DI-160, Form G-25 Interlock
111205	Shaft (Stamped G-27) for contact discs, for Type DI-160, Form G-27 Interlock
111206	Shaft (Stamped H-5) for contact discs, for Type DI-160, Form H-5 Interlock
111207	Shaft (Stamped E-1) for contact disc, for Type DI-166, Form E-1 Interlock
111208	Shaft (Stamped E-2) for contact disc, for Type DI-166, Form E-2 Interlock
111209	Shaft (Stamped E-3) for contact discs, for Type DI-166, Form E-3 Interlock
111210	Shaft (Stamped E-4) for contact discs, for Type DI-166, Form E-4 Interlock
111211	Shaft (Stamped E-5) for contact discs, for Type DI-166, Form E-5 Interlock
111212	Shaft (Stamped E-7) for contact discs, for Type DI-166, Form E-7 Interlock
111213	Shaft (Stamped E-18) for contact discs, for Type DI-166, Form E-18 Interlock
111214	Shaft (Stamped E-20) for contact discs, for Type DI-166, Form E-20 Interlock
111215	Shaft (Stamped E-24) for contact discs, for Type DI-166, Form E-24 Interlock
111216	Shaft (Stamped E-25) for contact discs, for Type DI-166, Form E-25 Interlock
111217	Shaft (Stamped E-27) for contact discs, for Type DI-166, Form E-27 Interlock
111218	Shaft (Stamped F-5) for contact discs, for Type DI-166, Form F-5 Interlock
111148	Brass collar for shaft, for Type DI-160, Forms G-3, G-5, G-20, G-24, G-25, H-5 and Type DI-166, Form E-3, E-5, E-20, E-24, E-25 and F-5; and large collar for Type DI-160, Forms G-1, G-2, G-4, G-7, G-18, G-27 and Type DI-166, Forms E-1, E-2, E-4, E-7, E-18, E-27 Interlocks
46796	Small brass collar for shaft, for Type DI-160, Forms G-1, G-2, G-4, G-7, G-18 and Type DI-166, Forms E-1, E-2, E-4, E-7 and E-18 Interlocks
46795	Small brass collar for shaft, for Type DI-160, Form G-27 and Type DI-166, Form E-27 Interlocks
111149	Fiber sleeve for shaft, for Forms H-5 and F-5 Interlocks
56847	Spring cotter for Nos. 111148, 46795, 111149 ($\frac{1}{8}$ " \times $\frac{1}{8}$ "
16076	Spring cotter for No. 46796 ($\frac{1}{8}$ " \times 1")
111150	Bracket with operating link for shaft
16118	Spring cotter for link and shaft ($\frac{1}{8}$ " \times $\frac{1}{4}$ "
32815	Screw fastening No. 111150 in position (12-24, $\frac{3}{8}$ " R.H. Blued)
111126	Positive lock washer for No. 32815 ($\frac{3}{32}$ " \times $\frac{1}{16}$ " \times $\frac{3}{4}$ " Thick)
17399	Washer for No. 32815 ($\frac{1}{8}$ " \times $\frac{1}{16}$ " \times .014")
111152	Insulating crosshead with pin, for shaft
44049	Adjusting nut for shaft (14-24, $\frac{1}{16}$ " Thick, $\frac{3}{8}$ " across flats Hex. Blued Cham. one side)
110624	Positive lock washer for No. 44049 ($\frac{3}{32}$ " \times $\frac{1}{16}$ " \times $\frac{3}{4}$ " Thick)

TYPE M CONTROL CONNECTION BOXES

TYPE BJ-348, FORMS A, B AND C, 7 WIRE

The *control connection boxes* (Type BJ-335 Forms A, B and C; BJ-340 Forms A, B and C) are used principally with Sprague-General Electric Type M Equipments, but can be used as common junction boxes on any railway circuits of not over *20 ampere capacity*.

The "motor lead" and "cable splice" boxes are adaptable to all types of equipments.



Dimensions of BJ-348 Forms A, B and C Connection Boxes

The frame has two cable entrance holes on one side, and three on the opposite side, all tapped for the wiring conduit pipes. The box has seven $\frac{1}{8}$ -in. contact studs held in a compound slab which is screwed to the frame casting. Each stud is insulated from the next by a division plate which is a moulded part of the compound slab holding the studs. It is designed to be fastened to its support by four $\frac{1}{4}$ -in. bolts.

Cat. No.	Description
48139	* Type BJ-348, Form A, Type M Control Connection Box, complete
48140	§ Type BJ-348, Form B, Type M Control Connection Box, complete
48141	Δ Type BJ-348, Form C, Type M Control Connection Box, complete

PARTS

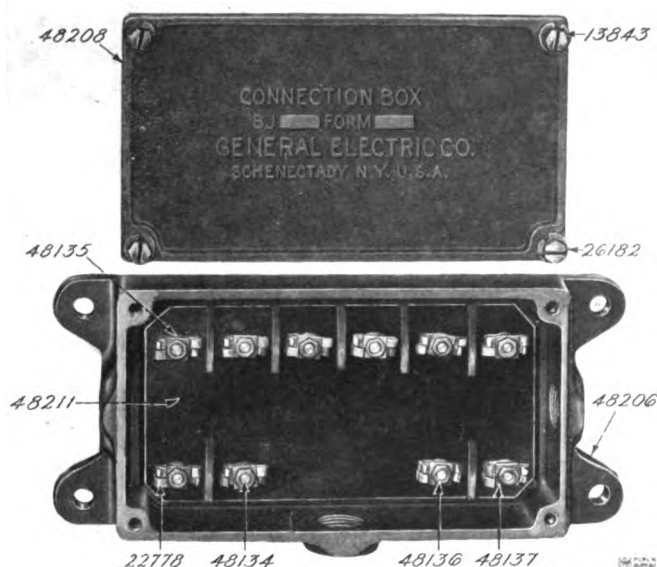
48142	BOX CASTING, with wire guards for No. 48139
48143	Box casting, with wire guards for No. 48140
48144	Box casting, with wire guards for No. 48141
48145	Long wire guard, with rivets for Nos. 48142, 48144
48146	Long wire guard, with rivets for No. 48143
48147	Short wire guard, with rivets for Nos. 48142, 48144
48148	Short wire guard, with rivets for No. 48143
48149	Cover with rubber packing
48150	Rubber packing for cover
13843	Cap screw fastening cover to box casting ($\frac{3}{8}$ "-16, 1" Hex. H. Slot.)
26182	Lock washer for No. 13843
48151	CONNECTION BOARD, complete, with contact studs and terminals
48152	Connection board
51633	Screw fastening No. 48152 to box casting (14-24, $\frac{3}{4}$ " R.H.)
22780	Lock washer for No. 51633 ($\frac{11}{16}$ " x $\frac{1}{2}$ " x .060")
48134	Contact stud ($\frac{5}{16}$ "-18, 1 $\frac{9}{16}$ " long)
22778	Copper terminal for stud
48135	Washer for stud ($\frac{11}{16}$ " x $\frac{1}{2}$ " x .060" Brass)
48136	Nut for stud ($\frac{5}{16}$ "-18, $\frac{3}{16}$ " thick Hex. Brass Cham. both sides)
48137	Lock washer plate for No. 48136
48153	Insulation between connection board and box casting

Δ Has 2½ in. pipe tapped outlets on one side and one on the opposite side. Otherwise as Form A.

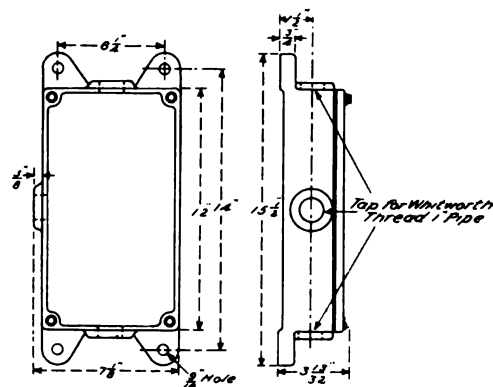
CONNECTION BOXES AND PARTS

TYPE M CONTROL CONNECTION BOXES

TYPE BJ-340, FORMS A AND B, 10 WIRE



BJ-340, Form A



Dimensions of BJ-340 Forms A and B Connection Boxes

The BJ-340 is in general like the BJ-348 but has ten contact threads. The frame has one hole, tapped for 1 in. pipe, on each of three sides.

Cat. No.	Description
48204	* Type BJ-340, Form A, Type M Control Connection Box, complete
48205	§ Type BJ-340, Form B, Type M Control Connection Box, complete

PARTS

48206	BOX CASTING for No. 48204
48207	Box casting for No. 48205
48208	Cover with rubber packing
48209	Rubber packing for cover
13843	Cap screw fastening cover to box casting ($\frac{3}{8}$ "-16, 1" Hex H. Slot)
26182	Lock washer for No. 13843
48210	CONNECTION BOARD, complete, with contact studs and terminals
48211	Connection board
51633	Screw fastening No. 48211 to box casting (14-24, $\frac{3}{4}$ " R.H.)
22780	Lock washer for No. 51633 ($\frac{11}{16}$ " x $\frac{1}{4}$ " x .060")
48134	Contact stud ($\frac{5}{16}$ "-18, $1\frac{5}{16}$ " long)
22778	Copper terminal for stud
48135	Washer for stud ($\frac{11}{16}$ " x $\frac{3}{8}$ " x .060" Brass)
48136	Nut for stud ($\frac{5}{16}$ "-18, $\frac{3}{16}$ " thick, Hex. Brass Cham. both sides)
48137	Lock washer plate for No. 48136
48212	Insulation between connection board and box casting

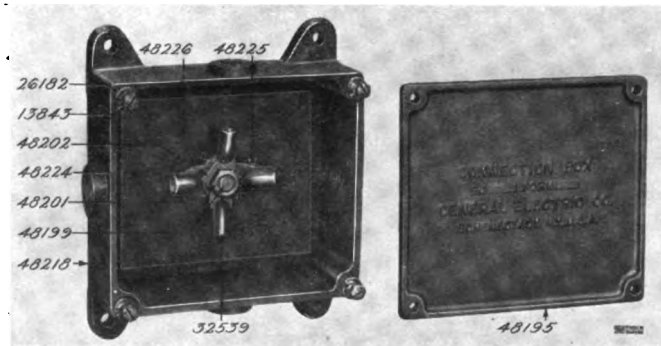
* Outlets tapped for 1 in. pipe. Whitworth thread.

§ Outlets tapped for 1 in. pipe. U. S. Standard thread.

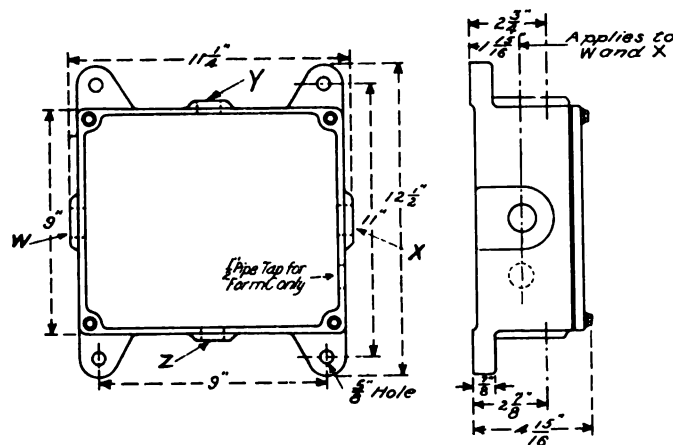
CONNECTION BOXES AND PARTS

BUS LINE

TYPE BJ-341, FORMS A, B, C, D AND E



BJ-341, Form A



The "bus line" connection box is used on systems where the cars are run in trains from a third rail. It acts as a common junction point for the leads from the third rail collector and the bus line coupler cable.

Each of the BJ-341 Forms A, B, C, D and E Bus Line Connection Boxes consists of a cast-iron box with cover, lined with rubber packing and held with four cap screws. It has a $\frac{5}{8}$ in. stud held in a compound slab. The stud on the Forms A, B, C and D accommodates four punched terminals, each with $\frac{3}{4}$ in. hole. Terminals in the Form E are drilled for No. 0000 wire.

Form A has an opening on each of the four sides tapped for conduit pipe. Two of these holes located on opposite sides are tapped for 1 in. pipes, the other two holds are tapped for $\frac{3}{4}$ in. and $\frac{1}{2}$ in. respectively. The four terminals are drilled $\frac{3}{4}$ in.

Form B is the same as Form A except that two of the holes located on opposite sides are tapped for 1 in. pipe and the other two are tapped for 1 in. and $\frac{3}{4}$ in. pipes respectively. It also has the same size terminals as Form A.

Form C has four openings located as follows:

One opening in one side tapped for $\frac{3}{4}$ in. pipe; in the opposite side two openings, one tapped for $\frac{3}{4}$ in. and the other for $\frac{1}{2}$ in. pipe, the fourth opening is in one of the adjacent sides and is tapped for $\frac{3}{4}$ in. pipe. It has the same size terminals as Form A.

Form D is the same as Form C except that the $\frac{1}{2}$ in. tap-hole is omitted.

Form E same as Form A except all openings are tapped for 1 in. pipe and the terminals are drilled for No. 0000 cable.

CONNECTION BOXES AND PARTS

BUS LINE—(Concluded)

TYPE BJ-341, FORMS A, B, C, D AND E

Form	PIPE TAPS (DIMENSIONS IN INCHES)			
	W	X	Y	Z
A	1	1	$\frac{1}{2}$	$\frac{3}{4}$
B	1	1	1	$\frac{3}{4}$
C	$\frac{3}{4}$	$\frac{3}{4}$		$\frac{3}{4}$
D	$\frac{3}{4}$	$\frac{3}{4}$		$\frac{3}{4}$
E	1	1	1	1

Cat. No.	Description
48213	Type BJ-341, Form A, Bus Line Connection Box, complete
48214	Type BJ-341, Form B, Bus Line Connection Box, complete
48215	Type BJ-341, Form C, Bus Line Connection Box, complete
48216	Type BJ-341, Form D, Bus Line Connection Box, complete
48217	Type BJ-341, Form E, Bus Line Connection Box, complete

PARTS

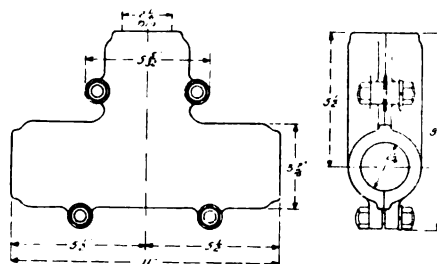
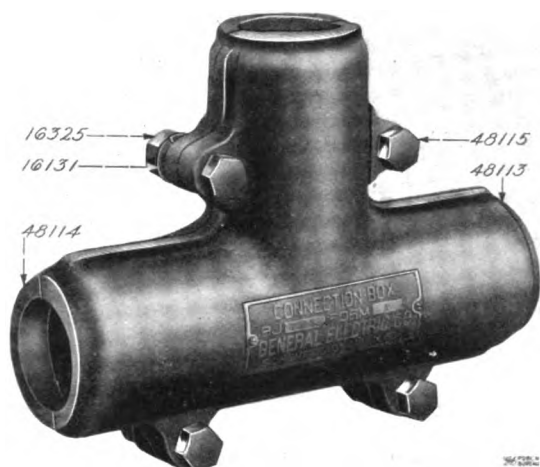
48218	Box casting, for No. 48213
48219	Box casting, for No. 48214
48220	Box casting, for No. 48215
48221	Box casting, for No. 48216
48222	Box casting, for No. 48217
48195	Cover with rubber packing
48196	Rubber packing for cover
13843	Cap screw fastening cover to box casting ($\frac{1}{2}$ "-16, 1" Hex. H. Slot.)
26182	Lock washer for No. 13843
48223	CONNECTION BOARD, complete, with contact stud and terminals
48224	Connection board
19878	Screw fastening No. 48224 to box casting (14-24, $\frac{1}{4}$ " R.H.)
22780	Lock washer for No. 19878 ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .060")
48199	Contact stud ($\frac{1}{2}$ "-11, $1\frac{1}{4}$ " long)
32539	*Copper terminal ($\frac{3}{16}$ " stud hole), for stud, for No. 48217, and small terminal for stud, for Nos. 48213, 48214, 48215, 48216
48225	Large terminal ($\frac{3}{16}$ " stud hole), for stud, for Nos. 48213, 48214, 48215, 48216
48226	Washer for stud ($\frac{1}{4}$ " x $1\frac{1}{2}$ " x .102")
48200	Retaining washer for stud ($\frac{1}{4}$ " x $\frac{1}{4}$ " x .125" countersunk hole)
48201	Nut for stud ($\frac{1}{2}$ "-11, $\frac{3}{8}$ " thick Hex. Cham. both sides)
48202	Lock washer plate, for No. 48201
48227	Insulation between connection board and box casting

* Size of bolt hole ($\frac{3}{16}$ in.) must be specified.

CONNECTION BOXES AND PARTS

CABLE SPLICE

TYPE BJ-345, FORM A



Dimensions of BJ-345 Form A Connection Box

The BJ-345 Form A, Cable Splice Connection Box is designed as a housing for a cable splice in car wiring, where cables are run in conduit pipe.

It consists of a "T"-shaped cast-iron box, and is in two halves which are bolted together by $\frac{1}{2}$ in. bolts over the cable splice, so as to inclose the bell mouths on the ends of the three conduit pipes. The pipe openings are $2\frac{1}{8}$ in. in diameter, and the box will inclose bell mouths $2\frac{1}{8}$ in. outside diameter. The bottom casting has a $\frac{1}{8}$ in. drip hole.

Cat. No.	Description
48112	Type BJ-345, Form A, Cable Splice Connection Box, complete

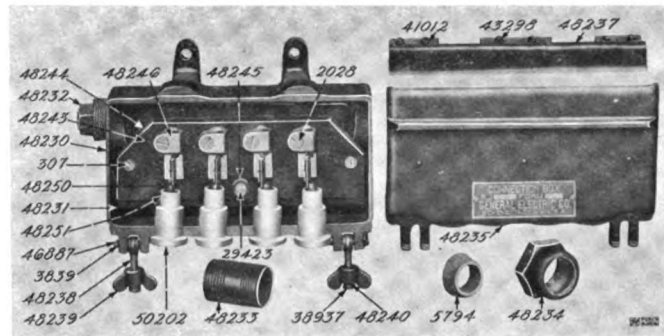
PARTS

48113	TOP CASTING
48114	Bottom casting
48115	Bolt for castings ($\frac{1}{2}$ "-13, $1\frac{1}{8}$ " Hex. H.)
16325	Nut for No 48115 ($\frac{1}{2}$ "-13, Hex. St'd)
16131	Lock washer for nut

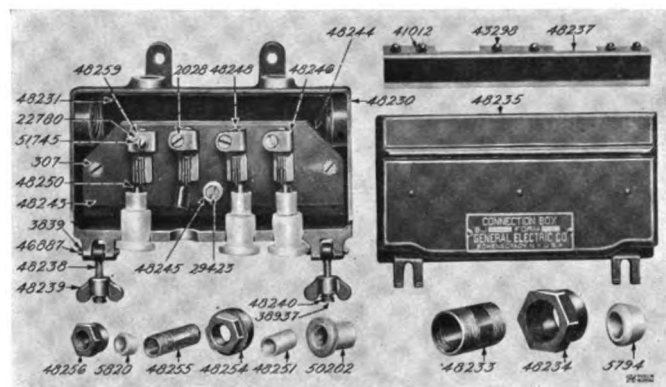
CONNECTION BOXES AND PARTS

MOTOR LEAD

TYPE BJ-343, FORMS C, D, E, F, G AND H



BJ-343, Form C



BJ-343, Form D

The Type BJ-343 Forms C, D, E, F, G and H Motor Lead Connection Boxes are used as common junction boxes for the flexible leads from the motors to the wires from the reverser, controller, etc., and, by making the motor leads capable of being easily disconnected, to facilitate the removal of the motors from beneath the car for repair and inspection. One box is required for each motor. The Forms C, E or G are used with one motor of a combination and the Forms D, F or H for the other; the latter types provide for special ground connection. Therefore orders, for this type of box should call, on a two-motor equipment, for one Form C and one Form D, or one Form E and one Form F, or one Form G and one Form H, depending on size of terminals and capacity of box wanted, and on a four-motor equipment for two Forms C and two Forms D, or two Forms E and two Forms F, or two Forms G and two Forms H, as the case may be.

The box is constructed of cast-iron and has a removable cast-iron cover. The cover and the bottom of the box are lined with a compound and a rubber packing. The box is tapped at each end for a $1\frac{1}{2}$ in. pipe. The wires from the controller enter through a bell mouth at one end of the box while the motor leads enter through four inlets 1 in. diameter at the bottom. When the cover is closed these motor leads are clamped in soft rubber bushings. The cover is held in place by thumbnut eyebolts. There are four two-way fixed terminals secured to a moulded compound board fastened to the bottom of each box. The controller wires have brass tube bushings soldered on the ends and are clamped by screws in the end of the fixed terminals.

The motor wires are soldered into copper tube terminals. The ends of these terminals are flat and connection is made to the fixed terminal by inserting the flat end into the jaws on the fixed terminal, in a manner similar to a knife blade switch.

CONNECTION BOXES AND PARTS

MOTOR LEAD

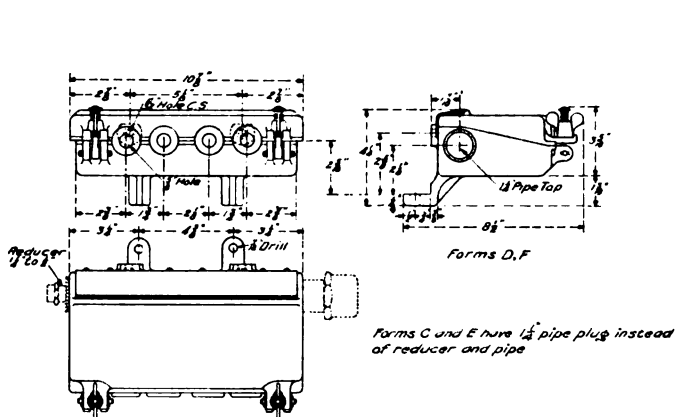


Fig. 1

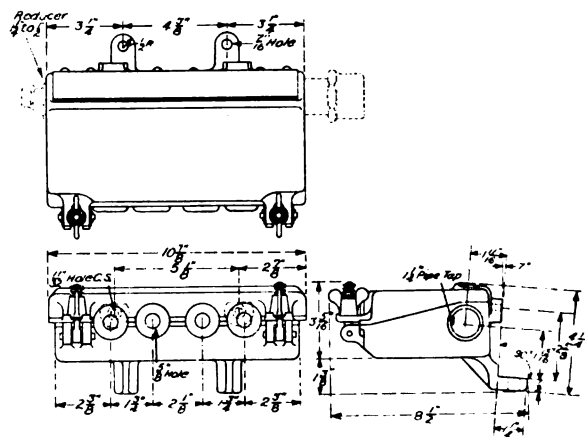


Fig. 2

TYPE BJ-343, FORMS C, D, E, F, G AND H

Cat. No.	Type	Form	Description	Dimen. Diag.
48228	BJ-343	C	Motor Lead Connection Box, complete	Fig. 1
48229	BJ-343	E	Motor Lead Connection Box, complete	Fig. 1
48252	BJ-343	D	Motor Lead Connection Box, complete	Fig. 1
48253	BJ-343	F	Motor Lead Connection Box, complete	Fig. 1
61156	BJ-343	G	Motor Lead Connection Box, complete	Fig. 2
61158	BJ-343	H	Motor Lead Connection Box, complete	Fig. 2

Form C.—Supplied with one $1\frac{1}{4}$ in. pipe plug, one $1\frac{1}{4}$ in. pipe nipple $2\frac{1}{2}$ in. long and one $1\frac{1}{4}$ in. bell mouth. The controller wires have brass-tube bushings $\frac{1}{4}$ in. inside diameter. The motor leads have copper tube terminals $\frac{3}{8}$ in. inside diameter.

Form D.—Same as Form C except that in place of pipe plug it has a reducing bushing $1\frac{1}{4}$ in. to $\frac{1}{2}$ in. and has a special terminal so that wire may be connected in the screw clamp for ground connection.

Form E.—Same as Form C except that the copper tube terminals for motor leads are $\frac{1}{8}$ in. inside diameter.

Form F.—Same as Form D except that the copper tube terminals for motor leads are $\frac{1}{8}$ in. inside diameter.

Form G.—Supporting lugs at an angle of 7 degrees, otherwise as Form C.

Form H.—Supporting lugs at an angle of 7 degrees, otherwise as Form D.

PARTS OF TYPE BJ-343, FORMS C, E AND G

Cat. No.	Description
48231	Insulation for box casting
48232	Pipe plug for box casting ($1\frac{1}{4}$ " pipe), for Nos. 48228, 48229
48233	Nipple for box casting ($1\frac{1}{4}$ " pipe, $2\frac{1}{2}$ " long)
48234	Bell mouth for nipple ($1\frac{1}{4}$ " pipe tap)
5794	Soft rubber gasket ($1\frac{1}{8}$ " hole for cable), for bell mouth
48254	Reducing bushing for box casting ($1\frac{1}{4}$ " to $\frac{1}{2}$ " pipe), for No. 61156
48255	Nipple for reducing bushing ($\frac{1}{2}$ " pipe, $2\frac{1}{2}$ " long), for No. 61156
48256	Bell mouth for No. 48255 ($\frac{1}{2}$ " pipe tap)
5820	Soft rubber gasket ($\frac{1}{2}$ " hole for cable), for No. 48256
48235	Cover with insulation
48236	Insulation and guide with rivets, for No. 48235
48237	Catch for cover
43298	Screw fastening No. 48237 to box casting (10-32, $\frac{1}{4}$ " R.H. Blued)
41012	Lock washer for No. 43298 ($\frac{3}{16}$ " x $\frac{3}{8}$ " x .044")
48238	Eyebolt for cover ($\frac{3}{8}$ "-18, 2" long, Sp'l)
48239	Wing nut for No. 48238 ($\frac{1}{8}$ "-18, Sp'l)
48240	Spring for wing nut
38937	Washer for spring ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .060")

CONNECTION BOXES AND PARTS

MOTOR LEAD—(Concluded)

PARTS OF TYPE BJ-343, FORMS C, E AND G

Cat. No.	Description
46887	Hinge pin for eyebolt ($\frac{1}{2}$ " x $1\frac{1}{8}$ ")
3839	Spring cotter for No. 46887 ($\frac{1}{8}$ " x $\frac{3}{8}$ ")
48241	CONNECTION BOARD, complete, with terminals, for Nos. 48228, 61156
48242	Connection board, complete, with terminals, for No. 48229
48243	Connection board
48244	Rubber packing for connection board
29423	Long screw fastening connection board and insulation for box casting to box casting (14-24, $1\frac{1}{2}$ " F.H.)
307	Short screw fastening connection board and insulation for box casting to box casting (14-24, 1 " F.H.)
48245	Fiber bushing for No. 29423
48246	Terminal block, complete, with clips, for No. 48241
48247	Terminal block, complete, with clips, for No. 48242
48248	Bushing for No. 48246
48249	Bushing for No. 48247
2028	Binding screw for terminal block (14-24, $\frac{3}{8}$ " F.H.)
1887	Screw fastening terminal block to connection board (14-24, $\frac{3}{8}$ " F.H.)
48250	Copper terminal
48251	Insulating sleeve for copper terminal
50202	Soft rubber bushing for box casting

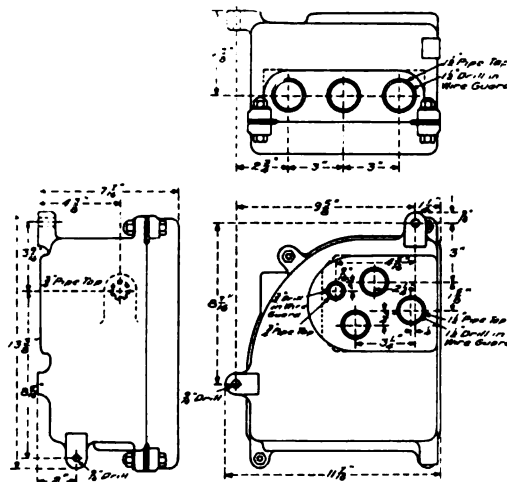
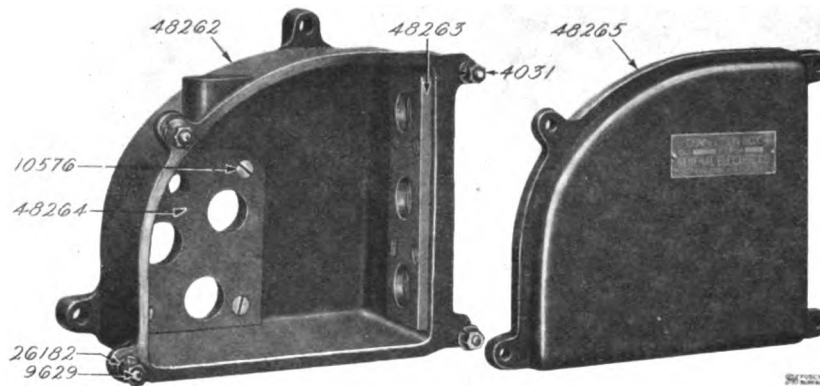
PARTS OF TYPE BJ-343 FORMS D, F AND H

48231	Insulation for box casting
48233	Nipple for box casting ($1\frac{1}{2}$ " pipe, $2\frac{1}{2}$ " long)
48234	Bell mouth for nipple ($1\frac{1}{2}$ " pipe tap)
5794	Soft rubber gasket ($1\frac{1}{8}$ " hole for cable), for No. 48234
48254	Reducing for box casting ($1\frac{1}{2}$ " to $\frac{1}{2}$ " pipe)
48255	Nipple for reducing bushing ($\frac{1}{2}$ " pipe, $2\frac{1}{2}$ " long)
48256	Bell mouth for No. 48255 ($\frac{1}{2}$ " pipe tap)
5820	Soft rubber gasket ($\frac{1}{2}$ " hole for cable), for No. 48256
48235	Cover with insulation
48236	Insulation and guide with rivets, for No. 48235
48237	Catch for cover
43298	Screw fastening No. 48237 to box casting (10-32, $\frac{1}{2}$ " R.H. Blued)
41012	Lock washer for No. 43298 ($\frac{1}{8}$ " x $\frac{3}{8}$ " x .044")
48238	Eyebolt for cover ($\frac{1}{8}$ "-18, $2\frac{1}{2}$ " long, Sp'l)
48239	Wing nut for No. 48238 ($\frac{1}{8}$ "-18, Sp'l)
48240	Spring for wing nut
38937	Washer for spring ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .060")
46887	Hinge pin for eyebolt ($\frac{1}{2}$ " x $1\frac{1}{8}$ ")
3839	Spring cotter for No. 46887 ($\frac{1}{8}$ " x $\frac{3}{8}$ ")
48257	CONNECTION BOARD, complete, with terminals, for Nos. 48252, 61158
48258	Connection board, complete, with terminals, for No. 48253
48243	Connection board
48244	Rubber packing for connection board
29423	Long screw fastening connection board and insulation for box casting to box casting (14-24, $1\frac{1}{2}$ " F.H.)
307	Short screw fastening connection board and insulation for box casting to box casting (14-24, 1 " F.H.)
48245	Fiber bushing for No. 29423
48259	Terminal block for two-wire connection, complete, with clips, for No. 48257
48260	Terminal block for two-wire connection, complete, with clips, for No. 48258
48246	Terminal block for one-wire connection, complete, with clips, for No. 48257
48247	Terminal block for one-wire connection, complete, with clips, for No. 48258
48248	Bushing for Nos. 48259, 48246
48249	Bushing for Nos. 48260, 48247
51745	Binding screw for Nos. 48259, 48260 (14-24, $\frac{3}{8}$ " R.H. Blued)
2028	Binding screw for Nos. 48246, 48247 (14-24, $\frac{3}{8}$ " F.H.)
22780	Lock washer for No. 51745 ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .060")
1887	Screw fastening terminal block to connection board (14-24, $\frac{3}{8}$ " F.H.)
48250	Copper terminal
48251	Insulation sleeve for copper terminal
50202	Soft rubber bushing for box casting

CONNECTION BOXES AND PARTS

CABLE ENTRANCE

TYPE BJ-346, FORM A



The BJ-346 Form A Motor Lead Connection Box is used as a common junction box for the motor leads, when 28 Controllers are used, and cables run in conduit pipes.

The box is segment shaped and made of cast iron, with a cast iron cover, which is bolted on after the cable connections are made. It is supported by three $\frac{1}{2}$ in. bolts to the under side of the car floor, directly under the controller. The box has 8 openings, four in the top (three of which are tapped for $1\frac{1}{2}$ in. and one for $\frac{3}{4}$ in. pipe), three in one of the straight sides (tapped for $1\frac{1}{2}$ in. pipe) and one in the curved side (tapped for $\frac{3}{4}$ in. pipe).

Cat. No.

Description

48261

Type BJ-346, Form A Cable Entrance Connection Box, complete

PARTS

48262

BOX CASTING with wire guards

48263

Wire guard for side of box casting

48264

Wire guard for bottom of box casting

10576

Screw fastening Nos. 48263, 48264 to box casting ($\frac{1}{8}$ -18, 1" F.H.)

48265

Cover with rope packing

48266

Tarred rope packing ($\frac{1}{8}$ " diam. $3\frac{1}{2}$ " long)

9629

Cap screw fastening cover to box casting ($\frac{3}{8}$ -16, $1\frac{1}{4}$ " Hex. H.)

26182

Lock washer for No. 9629

4031

Nut for No. 9629 ($\frac{3}{8}$ -16, Hex. St'd)

COUPLER SOCKETS AND COUPLER PLUGS

USED PRINCIPALLY WITH SPRAGUE-GENERAL ELECTRIC TYPE M CONTROL EQUIPMENTS

The Type DA Coupler Sockets and Type DC Coupler Plugs are used in combination to make up complete couplers between cars running in trains.

* Two types of DA Coupler Sockets are used, *viz.*, the **platform suspension type** and the **dashboard suspension type**.

In all cases where no end door is used for the connecting passage between cars, the dashboard type of socket is recommended. In such cases one socket at each end of the car is required mounted directly in the center of the dashboard and located as high as possible above the draw bar. This insures the jumper cable being kept clear of the draw bar and reduces to a minimum the slack necessary. If the vestibule is provided with an end door, and there is a sufficient height above the rails, two sockets of platform type should be located at each end of the car underneath the bumper, and as near the sides of the car as possible, in order to clear the swing of the draw bar. Where the track has sharp curves, it is important that the sockets be not placed so far out that the slack of the cable will drag on the third rail or running rail when the car is rounding a curve.

The coupler socket consists of a malleable iron frame with a tapped entrance for the cable conduit, and a moulded insulation block in which the contact plugs are mounted. The plugs are made of tobin bronze split to give the proper contact pressure, and are connected to the train cable. The coupler socket is provided with a spring lid to keep out snow and dirt when the socket is not in use. This lid also holds in the plug under ordinary conditions, but if the train parts, the spring lid will be raised and the plug freed without injury to either jumper or socket.

† For connecting between coupler sockets on two cars a control jumper is used which consists of two coupler plugs connected by the proper length of jumper cable. The plug is designed to fit the coupler socket and has a malleable iron frame with a body of moulded insulation in which are mounted brass receptacles to fit the contact plugs of the coupler socket.

* This description does not apply to the single point heating and lighting circuit couplers (formerly known as "tow car couplers").

† Quotations will be furnished on application, covering control jumpers complete, *viz.*, two coupler plugs assembled with cable. Total overall length of jumper (from face to face of plugs) should be given.

COUPLER SOCKETS AND COUPLER PLUGS

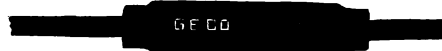
SINGLE POINT COUPLERS FOR LIGHTING AND HEATING CIRCUITS

(Formerly Known as Tow Car Couplers)

The Single Point Lighting and Heating Couplers are used between motor cars and trailers to connect the lighting or heating circuits. They are suspended between the hoods of the cars, and



Open



Closed

Cat. No. 17312, Single Point Coupler, 25 Ampere Capacity

with standard types, sufficient cable is furnished to meet the more general conditions of operation. Couplers are furnished with short lengths of cable as listed below.



Open



Closed

Cat. No. 15082, Single Point Coupler, 75 Ampere Capacity



Cat. No. 17775 DA 85 Form A
Socket

COUPLER SOCKETS

The Type DA 87 Form A Coupler Sockets (Cat. Nos. 59105 and 62489) are designed for fastening to any flat surface, and to act as a socket in which one-half of Couplers Cat. Nos. 15082, 59104 and 59106 can be inserted. The Type DA 85 Form A Socket Cat. No. 17775 is used to hold one-half of Coupler Cat. No. 17312 when the latter is not connected between cars.

Cat. No.	Description	Cap. in Amp.
17312	Single Point Coupler, complete, includes two Type DC 60 Form A Plugs with cable 36" long, 25 No. 25 B.&S. extra flexible rubber covered wire	25
17775	*Type DA 85 Form A Coupler Socket	..
59104	Single Point Coupler, complete, includes two Type DC 62 Form A Plugs with cable 12" long, 150 No. 25 B.&S. extra flexible rubber covered wire	75
15082	Single Point Coupler, complete, includes two Type DC 62 Form A Plugs with cable 36" long, 150 No. 25 B.&S. extra flexible rubber covered wire	75
59106	†Single Point Coupler, complete, includes two Type DC 62 Form B Plugs with $\frac{1}{4}$ " hole for cable	75
59105	‡Type DA 87 Form A Coupler Socket, complete, with cable 12" long, 150 No. 25 B.&S. rubber covered cable	75
62489	‡Type DA 87 Form A Coupler Socket, complete, same as Cat. No. 59105, except does not include cable	75

* Used to hold one-half of Cat. No. 17312 when not in use.

† No cable furnished. The DC 62 Form B Plug is the same as the DC 62 Form A except that the hole for cable of the Form B is slightly larger.

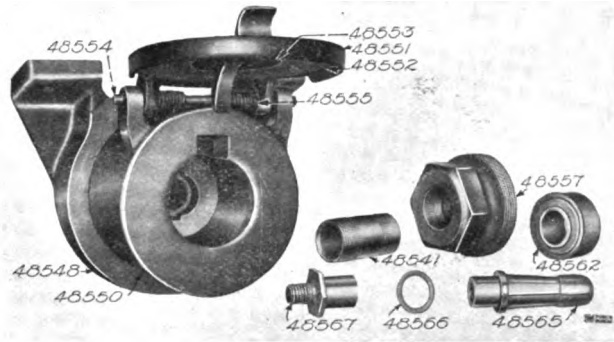
‡ Designed to be fastened by screws to flat surface, forming a socket for one-half of Cat. Nos. 15082, 59104 and 59106.

COUPLER SOCKETS AND COUPLER PLUGS

SINGLE POINT BUS LINE COUPLER SOCKETS

TYPE DA 33 FORMS A, B, C, D AND E

350 Amperes—650 Volts



The **Type DA 33 Form A** is a single point platform type bus line socket and is used in combination with the Type DC 28 Form A or C coupler plugs.

The cable entrance consists of a bell mouth with a soft rubber bushing to make a water-tight joint suitable for No. 000 cable.

The Terminal—Has a $\frac{9}{16}$ in. hole at back suitable for No. 000 cable.

Form B—Same as Form A except that bell mouth is tapped for 1 in. pipe and a 1 in. pipe nipple $1\frac{1}{2}$ in. long is furnished to make connection between conduit pipe and coupler socket frame.

Form C—Same as Form A except that cable terminal has hole $\frac{3}{8}$ in. in diameter suitable for No. 00 cable.

Form D—Same as Form C except that bell mouth is tapped for $\frac{3}{4}$ in. pipe and a $\frac{3}{4}$ in. pipe nipple $1\frac{1}{2}$ in. long is furnished to make connection between conduit pipe and coupler socket frame.

Form E—Same as Form C except that it has an offset bell mouth tapped for $\frac{3}{4}$ in. pipe.

Cat. No.	Description
48543	Type DA 33 Form A Coupler Socket
48544	Type DA 33 Form B Coupler Socket
48545	Type DA 33 Form C Coupler Socket
48546	Type DA 33 Form D Coupler Socket
48547	Type DA 33 Form E Coupler Socket

REPAIR PARTS

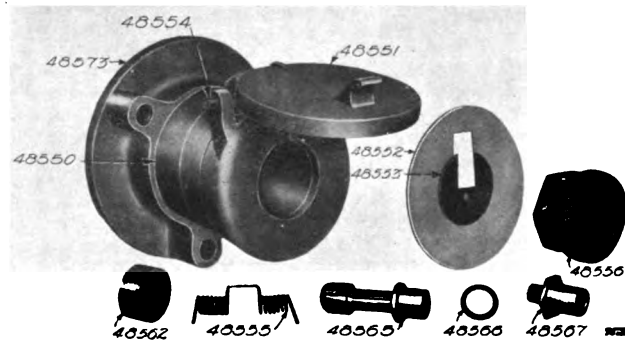
48548	FRAME, complete, for Cat. Nos. 48543, 48544, 48545, 48546
48549	Frame, complete, for Cat. No. 48547
48550	Insulation body, for frame
48551	Cover for frame, with rubber packing and retaining plate
48552	Rubber packing for cover
48553	Retaining plate with rivet, for Cat. No. 48552
48554	Hinge pin for cover
48555	Spring for cover
48556	Bell mouth plug for frame, for Cat. No. 48543
48557	Bell mouth plug for frame, for Cat. No. 48544
48558	Bell mouth plug for frame, for Cat. No. 48545
48559	Bell mouth plug for frame, for Cat. No. 48546
48560	Bell mouth cap for frame, for Cat. No. 48547
382	Cap screw fastening Cat. No. 48560 to frame
48561	Soft rubber gasket between Cat. No. 48560 and frame
48562	Soft rubber bushing for bell mouths
48541	Nipple for Cat. No. 48557
48564	Nipple for Cat. No. 48559
48565	Contact plug
48566	Washer for Cat. No. 48565 (Brass)
48567	Brass terminal for contact plug, for Cat. Nos. 48543, 48544
48568	Brass terminal for contact plug, for Cat. Nos. 48545, 48546, 48547

COUPLER SOCKETS AND COUPLER PLUGS

SINGLE POINT BUS LINE COUPLER SOCKETS

TYPE DA 35 FORMS A, B, C AND D

350 Amperes—650 Volts



The **Type DA 35 Form A** is a single point dashboard type bus line socket and is used in combination with Type DC 28 Forms A and C coupler plugs.

The cable entrance is a bell mouth with a soft bushing to make a water-tight joint, suitable for No. 000 cable.

The **Terminal**—Has a $\frac{3}{8}$ in. hole suitable for No. 000 cable.

Form B—Same as Form A except in having bell mouth tapped for 1 in. pipe nipple.

Form C—Same as Form A except that it has a terminal with a .44 in. hole suitable for No. 00 cable.

Form D—Same as Form B except in having bell mouth tapped for $\frac{3}{4}$ in. pipe nipple.

Cat. No.	Description
48569	Type DA 35 Form A Coupler Socket
48570	Type DA 35 Form B Coupler Socket
48571	Type DA 35 Form C Coupler Socket
48572	Type DA 35 Form D Coupler Socket

REPAIR PARTS

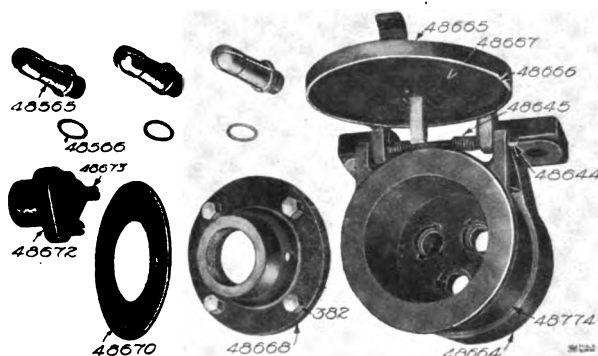
48573	FRAME, complete
48550	Insulation body for frame
48551	Cover for frame, with rubber packing and retaining plate
48552	Rubber packing for cover
48553	Retaining plate with rivet, for Cat. No. 48552
48554	Hinge pin for cover
48555	Spring for cover
48556	Bell mouth plug for frame, for Cat. No. 48569
48557	Bell mouth plug for frame, for Cat. No. 48570
48558	Bell mouth plug for frame, for Cat. No. 48571
48559	Bell mouth plug for frame, for Cat. No. 48572
48562	Soft rubber bushing for bell mouths
48541	Nipple for Cat. No. 48557
48564	Nipple for Cat. No. 48559
48565	Contact plug
48566	Washer for Cat. No. 48565 (Brass)
48567	Brass terminal for contact plug, for Cat. Nos. 48569, 48570
48568	Brass terminal for contact plug, for Cat. Nos. 48571, 48572

COUPLER SOCKETS AND COUPLER PLUGS

SINGLE POINT BUS LINE COUPLER SOCKETS

TYPE DA 48 FORMS A AND B

525 Amperes (Total)—650 Volts



The **Type DA 48 Form A** is a single point platform type bus line socket and is used in combination with the Type DC 34 Form A coupler plug.

The cable entrance is a bell mouth with $1\frac{1}{8}$ in. hole suitable for 1250/25 B.&S. extra flexible cable. A soft rubber bushing provides a water tight joint.

There are three $\frac{3}{4}$ in. tobin bronze contact plugs (combined capacity 525 amperes) mounted on a common terminal which has a $\frac{1}{2}$ in. hole at back suitable for 1250/25 B.&S. extra flexible cable.

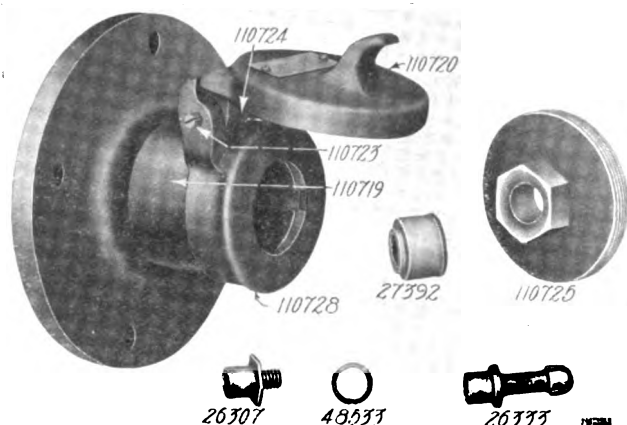
Form B—Same as Form A except bell mouth is tapped out for $1\frac{1}{2}$ in. pipe and a $1\frac{1}{2}$ in. pipe nipple $2\frac{1}{2}$ in. long is furnished to make connection between conduit pipe and coupler socket frame.

Cat. No.	Description
48662	Type DA 48 Form A Coupler Socket
48663	Type DA 48 Form B Coupler Socket

REPAIR PARTS

48664	FRAME, complete
48774	Insulation body, for frame
48665	Cover for frame, with rubber packing and retaining plate
48666	Rubber packing for cover
48667	Retaining plate with rivet, for Cat. No. 48666
48644	Hinge pin for cover
48645	Spring for cover
48668	Bell mouth cap for frame, for Cat. No. 48662
48669	Bell mouth cap for frame, for Cat. No. 48663
48673	Socket pipe plug for bell mouth caps
382	Cap screw fastening bell mouth cap to frame
48670	Soft rubber gasket between bell mouth cap and frame
48671	Nipple for Cat. No. 48669
48565	Contact plug
48566	Washer for Cat. No. 48565 (Brass)
48672	Brass terminal with studs, for contact plugs
48673	Stud for Cat. No. 48672

100 Amperes—650 Volts



Form B—Same as Form A except the bell mouth is tapped for $\frac{1}{2}$ in. pipe and a $\frac{1}{2}$ in. pipe nipple $1\frac{1}{2}$ in. long is furnished for connecting conduit piping to coupler socket frame.

Cat. No.	Description
64914	Type DA 60 Form A Coupler Socket
64916	Type DA 60 Form B Coupler Socket

REPAIR PARTS

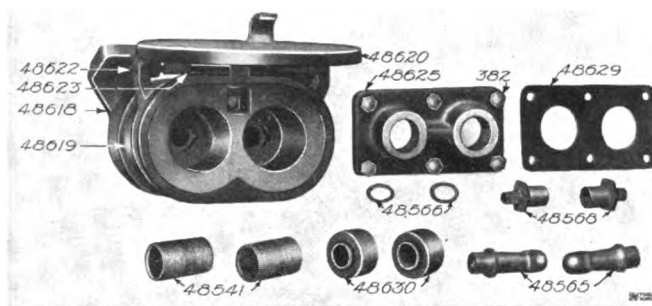
110728	FRAME, complete	.	.	.	.	.	.	.	.
110719	Insulation body for frame	.	.	.	.	.	.	.	.
110720	Cover for frame, with rubber packing and retaining plate	.	.	.	.	.	.	.	.
110721	Rubber packing for cover	.	.	.	.	.	.	.	.
110722	Retaining plate with rivets, for Cat. No. 110721	.	.	.	.	.	.	.	.
110723	Hinge pin for cover	.	.	.	.	.	.	.	.
110724	Spring for cover	.	.	.	.	.	.	.	.
110725	Bell mouth plug for frame	.	.	.	.	.	.	.	.
27392	Soft rubber bushing for bell mouth plug	.	.	.	.	.	.	.	.
110729	Bell mouth flange, for Cat. No. 64914	.	.	.	.	.	.	.	.
110730	Bell mouth flange, for Cat. No. 64916	.	.	.	.	.	.	.	.
5250	Cap screw fastening Cat. Nos. 110729, 110730 to frame	.	.	.	.	.	.	.	.
110727	Nipple for Cat. No. 110730	.	.	.	.	.	.	.	.
26333	Contact plug	.	.	.	.	.	.	.	.
48533	Brass washer for Cat. No. 26333	.	.	.	.	.	.	.	.
26307	Brass terminal for contact plug	.	.	.	.	.	.	.	.

COUPLER SOCKETS AND COUPLER PLUGS

TWO POINT BUS LINE COUPLER SOCKETS

TYPE DA 44 FORMS A AND B

350 Amperes (per Stud)—650 Volts



The **Type DA 44 Form A** is a two point platform type bus line coupler socket and is used in combination with the Type DC 31 Form A coupler plug.

The cable entrances consist of two bell mouths having inlets suitable for No. 00 cable and provided with rubber gaskets to make water-tight joints.

The Terminals—Have $\frac{3}{8}$ in. holes at back suitable for No. 00 cable.

Form B—Same as Form A except that the bell mouth is omitted and a pipe nipple connection for 1 in. pipe is furnished.

Cat. No.	Description
48614	Type DA 44 Form A Coupler Socket
48615	Type DA 44 Form B Coupler Socket

REPAIR PARTS

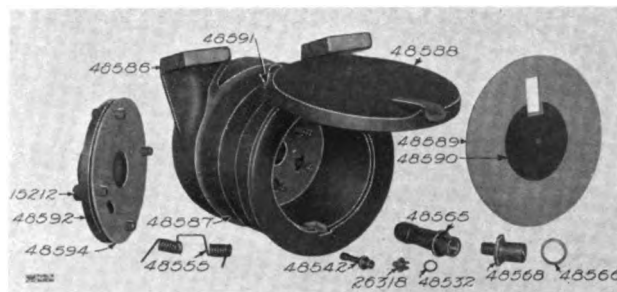
48618	FRAME, complete
48619	Insulation body for frame
48620	Cover for frame, with rubber packing
48621	Rubber packing, with rivets
48622	Hinge pin for cover
48623	Spring for cover
48624	Bell mouth cap for frame, for Cat. No. 48614
48625	Bell mouth cap for frame, for Cat. No. 48615
382	Cap screw fastening Cat. Nos. 48624, 48625, to frame
48629	Soft rubber gasket between bell mouth cap and frame
48630	Soft rubber bushing for frame, for Cat. Nos. 48614, 48615
48541	Nipple for Cat. No. 48625
48565	Contact plug for Cat. Nos. 48614, 48615
48566	Washer for Cat. No. 48565 (Brass)
48568	Brass terminal for contact plug, for Cat. Nos. 48614, 48615

COUPLER SOCKETS AND COUPLER PLUGS

SEVEN POINT COMBINATION CONTROL AND BUS LINE COUPLER SOCKET

TYPE DA 38 FORMS A AND B

$\frac{3}{4}$ In. Stud 350 Amperes
 $\frac{5}{16}$ In. Studs 25 Amperes Each } 650 Volts



The **Type DA 38 Form A** is a seven point platform type combination bus line and control socket and is used in combination with the Type DC 29 coupler plug.

The cable entrance is a bell mouth with inlet suitable for five wire combination control and bus line cable.

The socket has six $\frac{5}{16}$ in. tobin bronze contact plugs—capacity 25 amperes each; and one $\frac{3}{4}$ in. tobin bronze contact plug—capacity 350 amperes.

There are six terminals with $\frac{1}{4}$ in. hole suitable for 19/25 B.&S. control cable and one terminal with $\frac{3}{4}$ in. hole suitable for cable up to 500/25 B.&S. (160,000 cm.) or equivalent.

Form B—Same as Form A except bell mouth is omitted and a pipe nipple connection for $1\frac{1}{4}$ in. pipe is furnished.

Cat. No.	Description
48584	Type DA 38 Form A Coupler Socket
48585	Type DA 38 Form B Coupler Socket

REPAIR PARTS

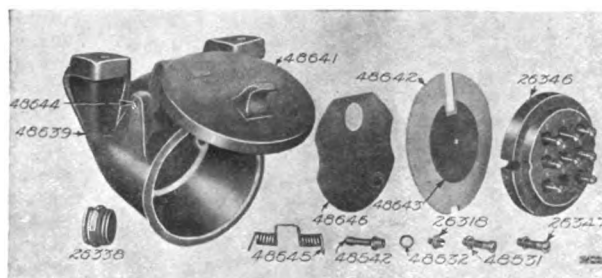
48586	FRAME, complete
48587	Insulation body for frame
48588	Cover for frame, with rubber packing and retaining plate
48589	Rubber packing for cover
48590	Retaining plate with rivet, for Cat. No. 48589
48591	Hinge pin for cover
48555	Spring for cover
48592	Bell mouth cap for frame, for Cat. No. 48584
48593	Bell mouth cap for frame, for Cat. No. 48585
15212	Cap screw fastening, Cat. Nos. 48592, 48593, to frame
48594	Leather gasket between bell mouth cap and frame
48595	Nipple for Cat. No. 48593
48565	Contact plug, large
48542	Contact plug, small
48566	Washer for Cat. No. 48565 (Brass)
48532	Washer for Cat. No. 48542 (Brass)
48568	Brass terminal for Cat. No. 48565
26318	Brass terminal for Cat. No. 48542

COUPLER SOCKETS AND COUPLER PLUGS

NINE POINT CONTROL COUPLER SOCKETS

TYPE DA 46 FORMS A, B AND C

25 Amperes (per Stud)—650 Volts



The **Type DA 46 Form A** is a nine point platform type control coupler socket and is used in combination with the Type DC 22 Form H coupler plug.

The Cable Entrance—Bell mouth has an inlet suitable for nine wire train cable.

Each terminal is suitable for a single conductor of a nine wire train cable.

Form B—Same as Form A except bell mouth is omitted and cable entrance is tapped for 1 in. pipe nipple.

Form C—Same as Form B except cable entrance is tapped for 1½ in. pipe.

Cat. No.	Description
48647	Type DA 46 Form A Coupler Socket
48648	Type DA 46 Form B Coupler Socket
48649	Type DA 46 Form C Coupler Socket

REPAIR PARTS

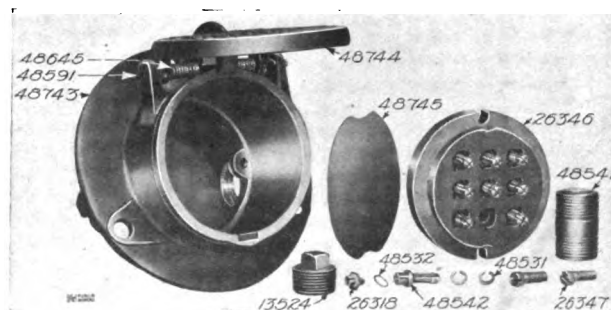
48639	FRAME (tapped for 1" pipe), for Cat. Nos. 48647, 48648
48640	Frame (tapped for 1½" pipe), for Cat. No. 48649
48641	Cover for frame, with rubber packing and retaining plate
48642	Rubber packing for cover
48643	Retaining plate with rivet, for Cat. No. 48642
48644	Hinge pin for cover
48645	Spring for cover
48646	Asbestos paper packing for frame
26338	Bell mouth plug for frame, for Cat. No. 48647
48541	Nipple for frame, for Cat. No. 48648
48595	Nipple for Cat. No. 48649
26346	Insulation block for contact plugs and terminals
26347	Screw fastening Cat. No. 26346 to frame
48531	Lock washer for Cat. No. 26347
48542	Contact plug
48532	Washer for Cat. No. 48542 (Brass)
26318	Brass terminal for contact plug

COUPLER SOCKETS AND COUPLER PLUGS

NINE POINT CONTROL COUPLER SOCKETS

TYPE DA 69 FORMS A AND B

25 Amperes (per Stud) 650 Volts



The **Type DA 69 Form A** is a nine point dashboard type control coupler socket and is used in combination with the Type DC 22 Form J coupler plug.

The Cable Entrance—Has four inlets each at right angles to center line of coupler which enables cable to enter either at top, bottom or either side. For the point of entrance a bell mouth suitable for a nine wire train cable is provided. For the other three inlets 1 in. flush pipe plugs are furnished.

Each terminal is suitable for a single conductor of a nine wire cable.

Form B—Same as Form A except point of entrance has a 1 in. pipe nipple in place of bell mouth.

Cat. No.	Description
48741	Type DA 69 Form A Coupler Socket
48742	Type DA 69 Form B Coupler Socket

REPAIR PARTS

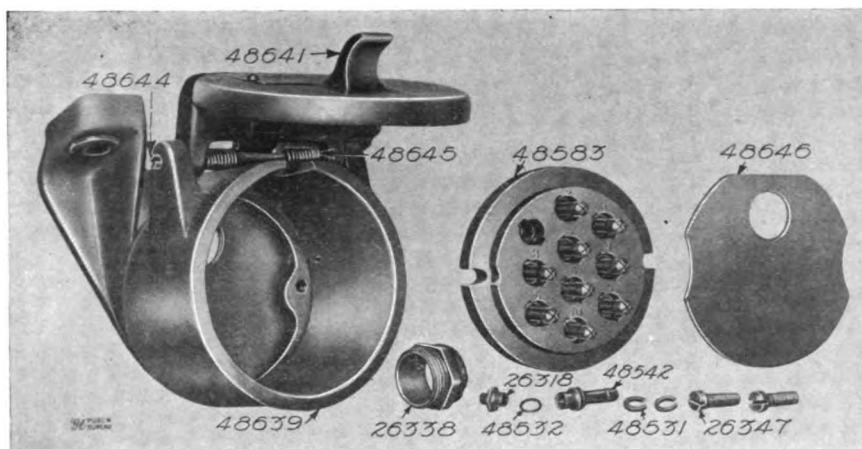
48743	FRAME (tapped for 1" pipe)
48744	Cover for frame, with rubber packing and retaining plate
48642	Rubber packing for cover
48590	Retaining plate with rivet, for Cat. No. 48642
48591	Hinge pin for cover
48645	Spring for cover
13524	Pipe plug for frame
26338	Bell mouth plug for frame, for Cat. No. 48741
48541	Nipple for frame, for Cat. No. 48742
48745	Asbestos paper packing for frame
26346	Insulation block for contact plugs and terminals
26347	Screw fastening Cat. No. 26346 to frame
48531	Lock washer for Cat. No. 26347
48542	Contact plug
48532	Washer for Cat. No. 48542 (Brass)
26318	Brass terminal for contact plug

COUPLER SOCKETS AND COUPLER PLUGS

TEN POINT CONTROL COUPLER SOCKETS

TYPE DA 45 FORMS A, B AND C

25 Amperes (per Stud)—650 Volts



The **Type DA 45 Form A** is a ten point platform type socket and is used in combination with the Type DC 20 Form B coupler plug. The cable entrance is a bell mouth with a $1\frac{1}{16}$ in. inside diameter suitable for a ten wire train cable.

Form B—Same as Form A excepting that a 1 in. pipe nipple is supplied in place of a bell mouth.

Form C—Same as Form A excepting that a $1\frac{1}{4}$ in. pipe nipple is supplied in place of a bell mouth.

Cat. No.	Description
48636	Type DA 45 Form A Coupler Socket
48637	Type DA 45 Form B Coupler Socket
48638	Type DA 45 Form C Coupler Socket

REPAIR PARTS

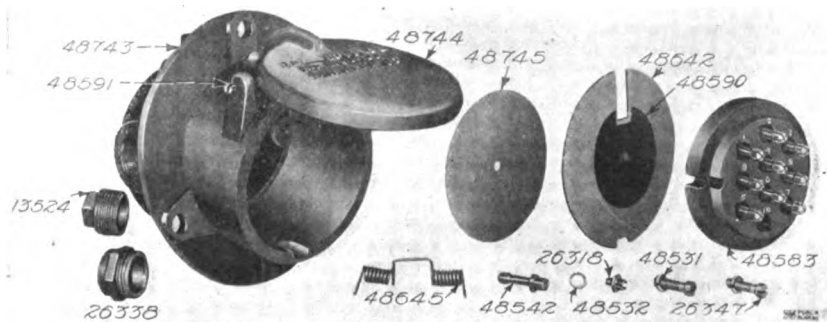
48639	FRAME (tapped for 1" pipe), for Cat. Nos. 48636, 48637
48640	Frame (tapped for $1\frac{1}{4}$ " pipe), for Cat. No. 48638
48641	Cover for frame with rubber packing and retaining plate
48642	Rubber packing for cover
48643	Retaining plate with rivet, for Cat. No. 48642
48644	Hinge pin for cover ($\frac{1}{4}$ " x $5\frac{1}{4}$ " Split end)
48645	Spring for cover
48646	Asbestos paper packing for frame
26338	Bell mouth plug for frame, for Cat. No. 48636
48541	Nipple (1" pipe, 2" long) for frame, for Cat. No. 48637
48595	Nipple ($1\frac{1}{4}$ " pipe, $2\frac{1}{4}$ " long), for Cat. No. 48638
48583	Insulation block for contact plugs and terminals
26347	Screw fastening Cat. No. 48583 to frame ($\frac{1}{8}$ "-18, $1\frac{1}{8}$ " Fill. H.)
48531	Lock washer for Cat. No. 26347 ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .0625")
48542	Contact plug
48532	Washer for Cat. No. 48542 ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .060" Brass)
26318	Brass terminal for contact plug

COUPLER SOCKETS AND COUPLER PLUGS

TEN POINT CONTROL COUPLER SOCKETS

TYPE DA 70 FORMS A, B AND C

25 Amperes (per Stud)—650 Volts



The **Type DA 70 Form A** is a ten point dashboard type socket and is used in combination with the Type DC 20 Form C coupler plug. Cable entrance may be made from the top, bottom or either side—a bell mouth with $1\frac{1}{8}$ in. inside diameter is provided for the entrance used and three pipe plugs for the holes not used.

Form B—Same as the Form A excepting that a 1 in. pipe nipple replaces the bell mouth.

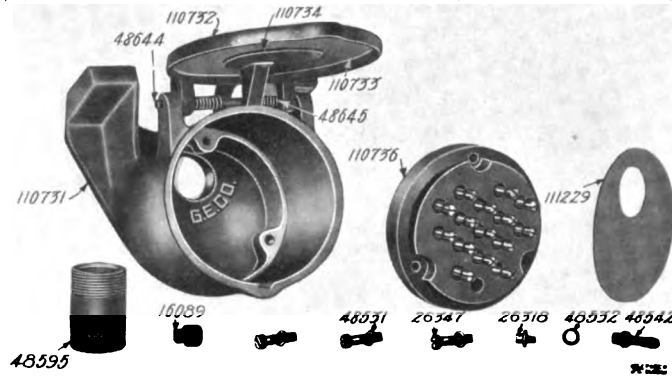
Form C—Same as the Form A excepting that a 1 in. pipe nipple (with Whitworth thread) replaces the bell mouth.

Cat. No.	Description
48746	Type DA 70 Form A Coupler Socket
48747	Type DA 70 Form B Coupler Socket

REPAIR PARTS

48743	FRAME (tapped for 1" pipe)	. . . . .
48744	Cover for frame, with rubber packing and retaining plate	. . . . .
48642	Rubber packing for cover	. . . . .
48590	Retaining plate with rivets, for Cat. No. 48642	. . . . .
48591	Hinge pin for cover ($\frac{1}{4}$ " x 5" Split end)	. . . . .
48645	Spring for cover	. . . . .
13524	Pipe plug (1" pipe), for frame	. . . . .
26338	Bell mouth plug for frame, for Cat. No. 48746	. . . . .
48541	Nipple (1" pipe, 2" long) for frame, for Cat. No. 48747	. . . . .
48745	Asbestos paper packing for frame	. . . . .
48583	Insulation block for contact plugs and terminals	. . . . .
26347	Screw fastening Cat. No. 48583 to frame ($\frac{1}{8}$ "-18, $1\frac{1}{8}$ " Fill. H.)	. . . . .
48531	Lock washer for Cat. No. 26347 ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .0625")	. . . . .
48542	Contact plug	. . . . .
48532	Washer for Cat. No. 48542 ($\frac{3}{16}$ " x $\frac{1}{2}$ " x .060" Brass)	. . . . .
26318	Brass terminal for contact plug	. . . . .

25 Amperes (per Stud)—650 Volts



Form B—Same as Form A except that a 1½ in. pipe nipple is supplied in place of the bell mouth.

Cat. No.	Description
64918	Type DA 76 Form A Coupler Socket
64920	Type DA 76 Form B Coupler Socket

REPAIR PARTS

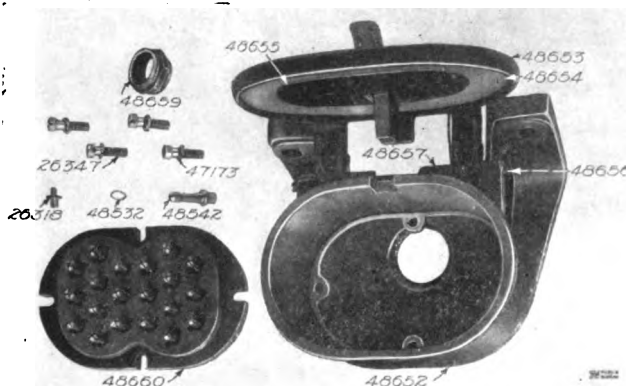
110731	FRAME
110732	Cover for frame, with rubber packing and retaining plate
110733	Rubber packing for cover
110734	Retaining plate with rivet, for Cat. No. 110733
111229	Asbestos paper packing for frame
48644	Hinge pin for cover
48645	Spring for cover
16089	Pipe plug for frame
110735	Bell mouth plug for frame, for Cat. No. 64918
48595	Nipple for frame, for Cat. No. 64920
110736	Insulation block for contact plugs and terminals
26347	Screw fastening Cat. No. 110736 to frame
48531	Lock washer for Cat. No. 26347
48542	Contact plug
48532	Washer for Cat. No. 48542 (Brass)
26318	Brass terminal for contact plug

COUPLER SOCKETS AND COUPLER PLUGS

TWENTY POINT CONTROL COUPLER SOCKETS

TYPE DA 47 FORMS A AND B

25 Amperes (per Stud)—650 Volts



The **Type DA 47 Form A** is a twenty point platform type control socket and is used in combination with the Type DC 33 coupler plug.

The cable entrance is a bell mouth with inlet suitable for twenty wire train cable.

Each terminal is suitable for a single conductor of a twenty wire train cable.

Form B—Same as Form A except that a $1\frac{1}{2}$ in. nipple is supplied in place of a bell mouth.

Cat. No.	Description
48650	Type DA 47 Form A Coupler Socket
48651	Type DA 47 Form B Coupler Socket

REPAIR PARTS

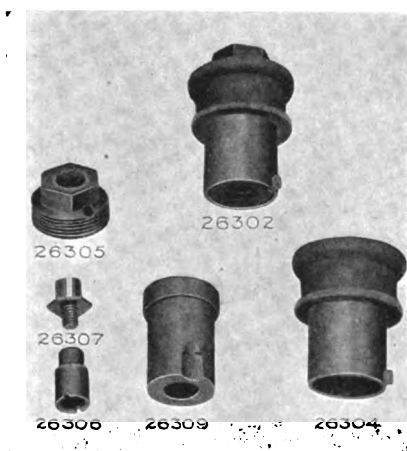
48652	FRAME (tapped for $1\frac{1}{4}$ " pipe)
48653	Cover for frame, with rubber packing and retaining plate
48654	Rubber packing for cover
48655	Retaining plate with rivets, for Cat. No. 48654
48656	Hinge pin for cover
48657	Spring for cover
48658	Asbestos paper packing for frame
48659	Bell mouth plug for frame, for Cat. No. 48650
48595	Nipple for frame, for Cat. No. 48651
48660	Insulation block for contact plugs and terminals
26347	Screw fastening Cat. No. 48660 to frame
47173	Lock washer for Cat. No. 26347
48542	Contact plug
48532	Washer for Cat. No. 48542 (Brass)
26318	Brass terminal for contact plug

COUPLER SOCKETS AND COUPLER PLUGS

SINGLE POINT BUS LINE COUPLER PLUGS

TYPE DC 25 FORM A

100 Amperes—650 Volts



The **Type DC 25 Form A** coupler plug is used in combination with the Type DA 60 coupler sockets.

The Cable Entrance—Bell mouth is suitable for 108 No. 24 B.&S. extra flexible cable (43,200 cm.) or its equivalent.

The Terminal—Hole at the back is drilled suitable for 108 No. 24 B.&S. extra flexible cable.

Cat. No.	Description
26302	Type DC 25 Form A Coupler Plug

REPAIR PARTS

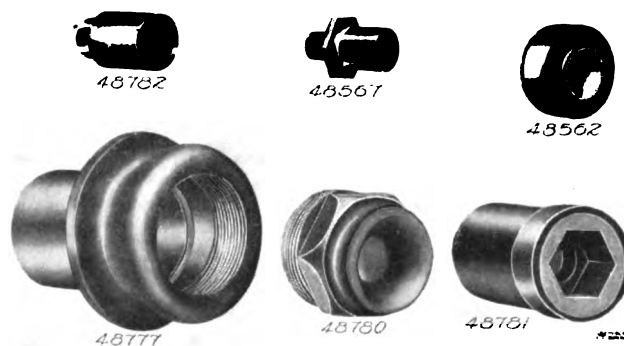
26304	FRAME for Cat. No. 26302, includes key and rivet
26305	Bell mouth plug for frames
27392	Soft rubber bushing, for Cat. No. 26305
26309	Insulation body for receptacle and terminal, for Cat. No. 26304
26306	Brass receptacle
26307	Brass terminal

COUPLER SOCKETS AND COUPLER PLUGS

SINGLE POINT BUS LINE COUPLER PLUGS

TYPE DC 28 FORMS A AND C

350 Amperes—650 Volts



The **Type DC 28 Form A** coupler plug is used in combination with the Type DA 33 and Type DA 35 coupler sockets.

The Cable Entrance is a bell mouth with $1\frac{3}{8}$ in. inside diameter and supplied with soft rubber gasket suitable for 550/25 B.&S. extra flexible cable.

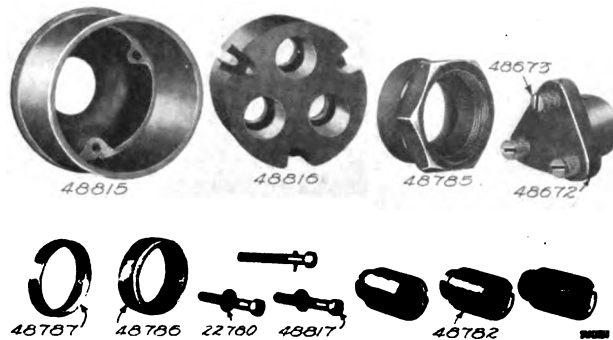
The Terminal—Has a $\frac{9}{16}$ in. hole at back suitable for 550/25 B.&S. extra flexible cable.

Form C—Same as Form A except it has a “Pistol Grip” bell mouth which tends to prevent the jumper cable from swinging and chafing. Should be recommended in preference to Form A.

Cat. No.	Description
48775	Type DC 28 Form A Coupler Plug

REPAIR PARTS

48777	FRAME for Cat. No. 48775
48780	Bell mouth plug for frame
48562	Soft rubber bushing, for Cat. No. 48780
48781	Insulation body for receptacle and terminal
48782	Brass receptacle
48567	Brass terminal

COUPLER SOCKETS AND COUPLER PLUGS**SINGLE POINT BUS LINE COUPLER PLUGS****TYPE DC 34 FORM A****525 Amperes (Total)—650 Volts**

The **Type DC 34 Form A** coupler plug is used in combination with the Type DA 48 coupler socket.

The cable entrance is a "Pistol Grip" bell mouth with $1\frac{1}{4}$ in. inside diameter and supplied with soft rubber gasket suitable for 1250/25 B.&S. extra flexible cable.

The Terminal—Has a cable hole suitable for 1250/25 B.&S. extra flexible cable. Acts as common terminal for the three contact sockets, total capacity 525 amperes.

Cat. No.	Description
48814	Type DC 34 Form A Coupler Plug

REPAIR PARTS

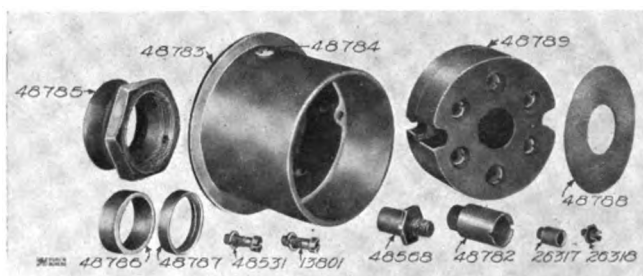
48815	FRAME
48785	Bell mouth for frame
48786	Soft rubber bushing
48787	Steel packing ring
48816	Insulation block for receptacles and terminals
48817	Screw fastening Cat. No. 48816 to frame
22780	Lock washer for Cat. No. 48817
48782	Brass receptacle
48672	Brass terminal with studs
48673	Stud for Cat. No. 48672

COUPLER SOCKETS AND COUPLER PLUGS

SEVEN POINT COMBINATION CONTROL AND BUS LINE COUPLER PLUGS

TYPE DC 29 FORM A

3/4 In. Receptacles—350 Amperes
5/16 In. Receptacles— 25 Amperes Each } 650 Volts



The **Type DC 29 Form A** seven point combination control and bus line coupler plug is used in combination with the Type DA 38 coupler socket.

The Cable Entrance—Bell mouth is suitable for five wire combination control and bus line jumper cable.

The plug has six terminals with hole at back suitable for 19/25 B.&S. control cable and one terminal suitable for cable up to 500/25 B.&S. (160,000 cm.) or equivalent.

Form B—Same as Form A except it has "Pistol Grip" bell mouth.

Cat. No.	Description
48606	Type DC 29 Form A Coupler Plug
64926	Type DC 29 Form B Coupler Plug

REPAIR PARTS

48783	FRAME, with guide pin
48784	Guide pin for frame
48785	Bell mouth for frame, for Cat. No. 48606
110741	Bell mouth with set screw for frame, for Cat. No. 64926
48763	Set screw for Cat. No. 110741
48786	Soft rubber bushing
48787	Steel packing ring
48788	Leather packing for frame
48789	Insulation block for receptacles and terminals
13801	Screw fastening Cat. No. 48789 to frame
48531	Lock washer for Cat. No. 13801
48782	Large brass receptacle
26317	Small brass receptacle
48568	Large brass terminal
26318	Small brass terminal
110744	Wire armor for cable

COUPLER SOCKETS AND COUPLER PLUGS

NINE POINT CONTROL COUPLER PLUGS

TYPE DC 22 FORMS H AND J

25 Amperes (per Receptacle)—650 Volts



The **Type DC 22 Forms H and J** nine point control coupler plugs are used in combination with the Type DA 46 and Type DA 69 coupler sockets respectively.

The cable entrance is a "Pistol Grip" bell mouth supplied with a rubber gasket suitable for nine wire jumper cable.

Each Terminal—Has a $\frac{1}{8}$ in. hole at back suitable for a single strand of jumper cable.

Form J—The Form J differs from the Form H only in that it has a short pin at the bottom to adapt it to use with the Type DA 69 coupler socket.

Cat. No.	Description
64922	Type DC 22 Form H Coupler Plug
64924	Type DC 22 Form J Coupler Plug

REPAIR PARTS

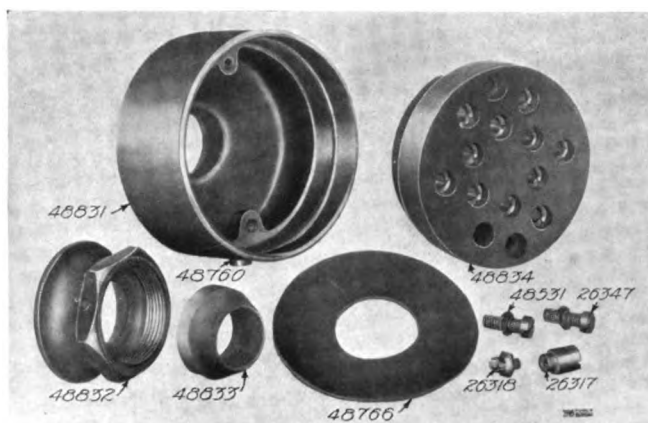
48770	FRAME with guide pin, for No. 64922
48771	Frame with guide pin, for No. 64924
26312	Guide pin for Cat. No. 48770
48760	Guide pin for Cat. No. 48771
26316	Leather packing for frame
110737	Bell mouth with set screw for frame
48763	Set screw for Cat. No. 110737
48734	Soft rubber bushing for frame
48765	Steel packing ring
26319	Insulation block for receptacles and terminals
13801	Screw fastening Cat. No. 26319 to frame
48531	Lock washer for Cat. No. 13801
26317	Brass receptacle
26318	Brass terminal
110738	Wire armor for cable

COUPLER SOCKETS AND COUPLER PLUGS

TWELVE POINT CONTROL COUPLER PLUGS

TYPE DC 47 FORMS A AND B

25 Amperes (per Receptacle)—650 Volts



The **Type DC 47 Form A** twelve point control coupler plug is used in combination with the Type DA 71 coupler socket.

The cable entrance is a bell mouth with rubber gasket, suitable for twelve wire jumper cable.

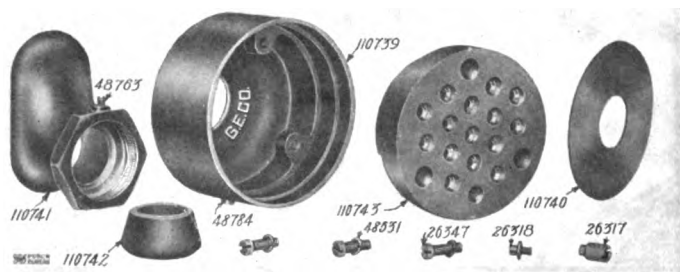
Each terminal is drilled for a single wire of a twelve wire jumper cable.

Form B—Same as Form A except that it is equipped with "Pistol Grip" bell mouth.

Cat. No.	Description
48830	Type DC 47 Form A Coupler Plug
64930	Type DC 47 Form B Coupler Plug

REPAIR PARTS

48831	FRAME, with guide pin
48760	Guide pin for frame
48832	Bell mouth for frame, for Cat. No. 48830
112176	Bell mouth with set screw for frame, for Cat. No. 64930
48763	Set screw for Cat. No. 112176
48833	Soft rubber bushing
48766	Leather packing for frame
48834	Insulation block for receptacles and terminals
26347	Screw fastening Cat. No. 48834 to frame
48531	Lock washer for Cat. No. 26347
26317	Brass receptacle
26318	Brass terminal
112177	Wire armor for cable

COUPLER SOCKETS AND COUPLER PLUGS**SIXTEEN POINT CONTROL COUPLER PLUGS****FORM DC 51 FORM A****25 Amperes (per Receptacle)—650 Volts**

The **Type DC 51 Form A** sixteen point control coupler plug used in combination with the Type DA 76 coupler socket.

The cable entrance is a "Pistol Grip" bell mouth suitable for sixteen wire jumper cable.

The terminals are drilled suitable for a single wire of a sixteen wire jumper cable.

Cat. No.	Description
64932	Type DC 51 Form A Coupler Plug

REPAIR PARTS

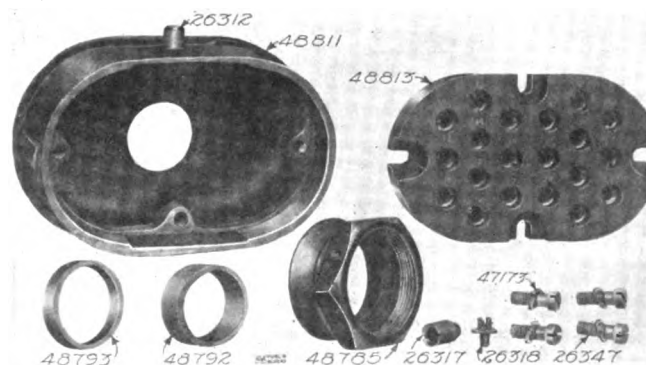
110739	FRAME, with guide pin
48784	Guide pin for Cat. No. 110739
110740	Leather packing for frame
110741	Bell mouth with set screw for frame
48763	Set screw for Cat. No. 110741
110742	Soft rubber bushing for bell mouth
110743	Insulation block for receptacles and terminals
26347	Screw fastening Cat. No. 110743 to frame
48531	Lock washer for Cat. No. 26347
26317	Brass receptacle
26318	Brass terminal
110744	Wire armor for cable

COUPLER SOCKETS AND COUPLER PLUGS

TWENTY POINT CONTROL COUPLER PLUGS

TYPE DC 33 FORMS A AND B

25 Amperes (per Receptacle)—650 Volts



The **Type DC 33 Form A** twenty point control coupler plug is used in combination with the Type DA 47 coupler socket.

The Cable Entrance—Bell mouth has an inlet suitable for 20 wire jumper cable.

Each terminal is suitable for a single conductor of a twenty wire jumper cable.

Form B—Same as Form A except that it is provided with "Pistol Grip" bell mouth.

Cat. No.	Description
48810	Type DC 33 Form A Coupler Plug
64928	Type DC 33 Form B Coupler Plug

REPAIR PARTS

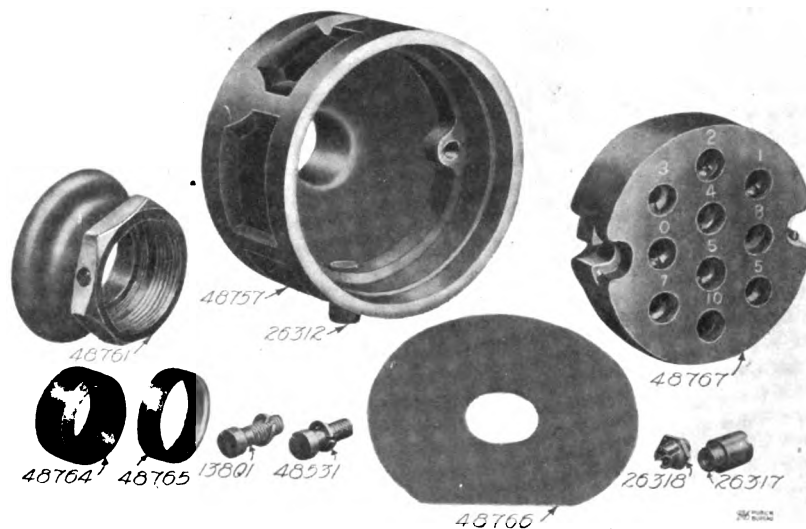
48811	FRAME, with guide pin
26312	Guide pin for frame
48785	Bell mouth for frame, for Cat. No. 48810
110741	Bell mouth with set screw for frame, for Cat. No. 64928
48763	Set screw for Cat. No. 110741
48792	Soft rubber bushing
48793	Steel packing ring
48812	Leather packing for frame
48813	Insulation block for receptacles and terminals
26347	Screw fastening Cat. No. 48813 to frame
47173	Lock washer for Cat. No. 26347
26317	Brass receptacle
26318	Brass terminal
110744	Wire armor for cable

COUPLER SOCKETS AND COUPLER PLUGS

TEN POINT CONTROL COUPLER PLUGS

TYPE DC 20 FORMS B AND C

25 Amperes (per Receptacle)—650 Volts



The **Type DC 20 Form B** is a ten point plug used in combination with the Type DA 45 coupler socket. Cable entrance is provided through a bell mouth $1\frac{5}{8}$ in. inside diameter with a rubber gasket, suitable for a ten wire jumper cable.

Form C—Same as Form B excepting has a short pin at the bottom and "Pistol Grip" bell mouth

Cat. No.	Description
48755	Type DC 20 Form B Coupler Plug
48756	Type DC 20 Form C Coupler Plug

REPAIR PARTS

48758	FRAME with guide pin, for Cat. No. 48755
48759	Frame with guide pin, for Cat. No. 48756
26312	Guide pin for Cat. Nos. 48757, 48758 ($\frac{1}{8}$ "-13, $\frac{1}{8}$ " long)
48760	Guide pin for Cat. No. 48759 ($\frac{1}{8}$ "-13, $\frac{1}{8}$ " long)
48761	Bell mouth, for Cat. No. 48758
48762	Bell mouth with set screw, for Cat. No. 48759
48763	Set screw for Cat. No. 48762 (14-24, $\frac{1}{8}$ " Headless Sp'l)
48764	Soft rubber bushing
48765	Steel packing ring
48766	Leather packing for frame
48767	Insulation for receptacles and terminals
13801	Screw fastening Cat. No. 48767 to frame ($\frac{1}{8}$ "-18, $\frac{1}{8}$ " Fill. H.)
48531	Lock washer for Cat. No. 13801 ($\frac{1}{4}$ " x $\frac{1}{2}$ " x .0625")
26317	Brass receptacle
26318	Brass terminal

WIRES AND CABLES

The General Electric Company manufactures all classes of cable, both high and low tension, for station, overhead, subterranean and submarine requirements. It is made with single, twin, triple or multiple conductor in the following finishes:—weatherproof braid, flameproof braid, asbestos braid, leaded, leaded with jute and asphalt jacket, leaded with jute and asphalt and band steel armor, leaded with jute and wire armor. The insulating materials are paper, rubber and varnished cambric.

Special attention is called to the varnished cambric insulated cables, either braided for interior wiring, or leaded for underground service. They have the same advantage over rubber that paper has, in that the conductor cannot be decentralized, while they also possess the non-absorbent qualities of rubber.

CABLES FOR SPRAGUE-GENERAL ELECTRIC TYPE M CONTROL

Size	Description	Weight per 1000 Ft.
19/25 B.&S.	Single conductor, rubber covered, double braid finish, equivalent in size to a No. 12 B.&S., used for connecting contactors and controllers	52 lbs.

TRAIN CABLES are multiple conductors, each single conductor being composed of 19/25 B.&S. wires, rubber covered, single braid and a braid finish overall.

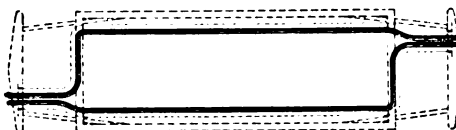
No. Conductors	Weight in Lb.	
5	255	
6	343	
7	373	
9	479	
10	503	
12	613	
20	893	Prices on Application

JUMPER CABLES are similar in construction to train cables with the exception that the group of conductors is surrounded by a rubber jacket. This cable is very flexible for connecting cars and is designed to withstand the constant swinging with a minimum amount of wear.

No. Conductors	Weight in Lb.	
5	371	
6	461	
7	491	
9	632	
10	687	
12	846	
20	1246	Prices on Application

Numerous special types of combined bus and control cables are also manufactured.

CONTROLLER CABLES OR MADE UP CABLES FOR CAR WIRING



This class of cable is made up complete for car wiring and embraces the controller and motor circuits; two cables comprise a set—with the exception of the cable for R-17 controllers which is a single-motor equipment—and the prices are per set-foot, the length of one cable being taken as a basis.

The outside finish of this cable may be either weatherproof compound over a cotton braid, or flameproof paint over an asbestos braid; this latter style meets Underwriters' requirements.

Made-up cables for conduit installation are supplied to meet specifications.

WIRES AND CABLES

CONTROLLER CABLES OR MADE UP CABLES FOR CAR WIRING

Cables are designed for use with the following controllers and 500-volt motors:

CONTROLLER		G.E. Motor No.	Weatherproof	Flameproof
No.	Capacity			
K- 2	2-40 h.p. motors	800 or 1000	Prices on Application	Prices on Application
K- 6	4-40 h.p. motors or 2-80 h.p.	58, 67, 70, 800 or 1000 73 or 74		
K-10	2-40 h.p. motors	52, 54, 58, 60, 67, 70, 80 or 1000		
K-11	2-60 h.p. motors	53, 57, 87 or 90		
K-12	4-30 h.p. motors	52, 54, 58, 60, 81 or 800		
K-14	4-60 h.p. motors	53, 57, 87 or 90		
K-28	4-40 h.p. motors or 2-80 h.p.	58, 67, 70 or 1000 73 or 74		
K-34	4-75 h.p. motors	204, 205 or 214		
K-35	4-50 h.p. motors	202, 213, 215, 216, 217 or 219		
K-36	2-60 h.p. motors	202, 210 or 218		
L- 4	4-100 h.p. motors	73 or 74		
B-13	2-40 h.p. motors	52, 54, 58, 60, 67, 70, 80, 800 or 1000		
B-18	2-40 h.p. motors	52, 54, 58, 60, 67, 70, 80, 800 or 1000		
R-17	1-50 h.p. motor	53, 57, 87 or 90		

The controllers with which these cables are used can also be operated with the same number of motors with one-half the horse-power and voltage rating. The prices of the cables will be the same.

SINGLE CONDUCTOR CABLES FOR CAR WIRING

Weatherproof Finish

This class of cable is made with separator, standard code insulation and single-braid weatherproof finish. Any number of extra braids may be furnished at additional prices.

Cables with a tape and braid finish are suitable for unlined conduit use.

Sizes 1/0 and larger are made with a tape and single braid; sizes smaller than 1/0 have one braid only but a tape may be supplied at an additional price.

Size	No. Wires in Strand	Diameter Bare Cable	Thickness of Rubber	Finished Diameter in In.	Weight per 1000 Ft.	Prices on Application
14	7	.073	$\frac{3}{64}$	.23	35
12	7	.092	$\frac{3}{64}$	.25	46
12	19	.090	$\frac{3}{64}$	.25	45
6	7	.184	$\frac{1}{16}$	.38	139
4	7	.232	$\frac{1}{16}$	.42	197
2	7	.293	$\frac{1}{16}$	.51	289
1	19	.332	$\frac{3}{64}$	.59	381
1/0	19	.375	$\frac{3}{64}$	.63	464
2/0	19	.419	$\frac{3}{64}$	.68	563
3/0	19	.470	$\frac{3}{64}$	.73	683
4/0	19	.528	$\frac{3}{64}$	.79	835
250,000	37	.576	$\frac{3}{32}$	.87	1032

Above are standard strands.

Flameproof Finish

CONFORMING TO N.E.C. STANDARD STRANDS

14	7	.073	$\frac{3}{64}$	.30	65
12	7	.092	$\frac{3}{64}$	.32	78
10	7	.116	$\frac{3}{64}$	.36	99
8	7	.146	$\frac{3}{64}$	.39	128

WIRES AND CABLES**SINGLE CONDUCTOR CABLES FOR CAR WIRING****Flameproof Finish**

Size	No. Wires in Strand	Diameter Bare Cable	Thickness of Rubber	Finished Diameter in In.	Weight per 1000 Ft.	
6	7	.184	$\frac{1}{16}$.49	189	Prices on Application
4	7	.232	$\frac{1}{16}$	.54	255
3	7	.260	$\frac{1}{16}$	.57	304
2	7	.292	$\frac{1}{16}$	.600	353
1	19	.332	$\frac{3}{32}$	.69	461
1/0	19	.375	$\frac{3}{16}$	.74	545
2/0	19	.419	$\frac{3}{16}$	.79	650
3/0	19	.470	$\frac{3}{16}$	.84	778
4/0	19	.528	$\frac{3}{16}$	.90	937
250,000	37	.576	$\frac{1}{8}$	.98	1138
300,000	37	.635	$\frac{3}{16}$	1.07	1330	
350,000	37	.682	$\frac{1}{8}$	1.12	1497	
400,000	37	.728	$\frac{1}{8}$	1.17	1676	
450,000	37	.777	$\frac{1}{8}$	1.22	1868	
500,000	61	.816	$\frac{1}{8}$	1.26	2024	
600,000	61	.855	$\frac{1}{8}$	1.33	2430	
750,000	61	1.00	$\frac{1}{4}$	1.46	2945	
1,000,000	61	1.16	$\frac{1}{4}$	1.62	3801	

CABLES FOR RAILWAY MOTOR LEADS**Weatherproof and Flameproof Finishes**

Extra flexible cables with one or more braids are generally used for motor leads and when ordering for this purpose care should be taken to specify the required outside diameter of cable so that a sufficient number of braids may be applied to insure a perfect fit with the rubber bushing in the motor case. These cables can be supplied with either one or more cotton braids weatherproofed or with cotton braids and an asbestos finishing braid with a flameproof filling; the latter type meets Underwriters' requirements.

WIRES AND CABLES

CABLES FOR RAILWAY MOTOR LEADS

Weatherproof and Flameproof Finishes

EXTRA FLEXIBLE

Type Motor	Volts	No. of Wires	Size of Wire B.&S.	Circular Mils	DIAMETER IN INCHES	
					Overall	Bare
GE-51	500	200	25	64,000	$\frac{3}{16}$	.325
GE-51	250	350	25	112,000	$\frac{3}{16}$	.425
GE-52	500	49	23	25,000	$\frac{3}{16}$	.200
GE-52	250	150	25	48,000	$\frac{3}{16}$	.285
GE-53	500	150	25	48,000	$\frac{3}{16}$	.285
GE-53	250	250	25	80,000	$\frac{3}{16}$	.350
GE-54	500	49	23	25,000	$\frac{3}{16}$	.200
GE-54	250	150	25	48,000	$\frac{3}{16}$	.285
GE-55	500	350	25	112,000	$\frac{3}{16}$	.425
GE-55	250	550	25	176,000	$\frac{3}{16}$	.530
GE-57	500	150	25	48,000	$\frac{3}{16}$	.285
GE-57	250	250	25	80,000	$\frac{3}{16}$	.350
GE-58	500	49	22	31,500	$\frac{3}{16}$	.228
GE-58	250	200	25	64,000	$\frac{3}{16}$	.325
GE-59	500	49	22	31,500	$\frac{3}{16}$	.228
GE-59	250	200	25	64,000	$\frac{3}{16}$	.325
GE-60	500	49	23	25,000	$\frac{3}{16}$	.200
GE-60	250	150	25	48,000	$\frac{3}{16}$	.285
GE-61	500	350	25	112,000	$\frac{3}{16}$	.425
GE-61	250	550	25	176,000	$\frac{3}{16}$	.530
GE-62	500	49	23	25,000	$\frac{3}{16}$	.200
GE-62	250	150	25	48,000	$\frac{3}{16}$	.285
GE-64	500	200	25	64,000	$\frac{3}{16}$	.325
GE-65	500	550	25	176,000	$\frac{3}{16}$	.530
GE-66	500	350	25	112,000	$\frac{3}{16}$	.425
GE-67	500	49	22	31,500	$\frac{3}{16}$	.228
GE-67	250	200	25	64,000	$\frac{3}{16}$	.325
GE-68	500	550	25	176,000	$\frac{3}{16}$	.530
GE-69	500	550	25	176,000	$\frac{3}{16}$	.530
GE-70	500	49	22	31,500	$\frac{3}{16}$	.228
GE-71	500	200	25	64,000	$\frac{3}{16}$	.325
GE-71	250	550	25	176,000	$\frac{3}{16}$	.530
GE-72	140	550	25	176,000	$\frac{3}{16}$	.530
GE-73	500	200	25	64,000	$\frac{3}{16}$	.325
GE-74	500	200	25	64,000	$\frac{3}{16}$	.325
GE-75	500	49	22	31,500	$\frac{3}{16}$	.228
GE-76	500	350	25	112,000	$\frac{3}{16}$	.425
GE-77	500	49	23	25,000	$\frac{3}{16}$	.200
GE-77	250	150	25	48,000	$\frac{3}{16}$	.285
GE-78	500	49	22	31,500	$\frac{3}{16}$	.228
GE-79	250	150	25	48,000	$\frac{3}{16}$	.285
GE-79	500	49	23	25,000	$\frac{3}{16}$	.200
GE-80	500	49	22	31,500	$\frac{3}{16}$	.228
GE-81	500	49	23	25,000	$\frac{3}{16}$	.200
GE-82	750	49	22	31,500	$\frac{3}{16}$	.228
GE-87	500	150	25	48,000	$\frac{3}{16}$	.285
GE-90	500	49	22	31,500	$\frac{3}{16}$	.228
GE-95	500	50	25	16,000	$\frac{3}{16}$	.15
GE-95	250	50	25	16,000	$\frac{3}{16}$	.15
GE-96	500	50	25	16,000	$\frac{3}{16}$	.15
GE-96	250	50	25	16,000	$\frac{3}{16}$	.15
GE-97	500	150	25	48,000	$\frac{3}{16}$	.285
GE-97	250	350	25	112,000	$\frac{3}{16}$	.425
GE-202	600	49	22	31,500	$\frac{3}{16}$	.228
GE-204	600	150	25	48,000	$\frac{3}{16}$	.285
GE-205	1200	350	25	112,000	$\frac{3}{16}$	.425
GE-205	600	350	25	112,000	$\frac{3}{16}$	.425
GE-207	1200	350	25	112,000	$\frac{3}{16}$	.425
GE-207	600	350	25	112,000	$\frac{3}{16}$	.425
GE-209	600	750	25	240,000	$1\frac{1}{8}$	.62
GE-210	600	150	25	48,000	$\frac{3}{16}$	.285

Prices on Application

WIRES AND CABLES

CABLES FOR RAILWAY MOTOR LEADS

Weatherproof and Flameproof Finishes

EXTRA FLEXIBLE

Type Motor	Volts	No. of Wires	Size of Wire B.&S.	Circular Mils	DIAMETER IN INCHES		
					Overall	Bare	
GE-211	600	350	25	112,000	$\frac{3}{4}$.425	Prices on Application
GE-212	600	550	25	176,000	$\frac{1}{2}$	.530
GE-213	600	49	22	31,500	$\frac{1}{8}$	.228
GE-216	600	49	22	31,500	$\frac{1}{8}$	.228
GE-217	1200	150	25	48,000	$\frac{3}{8}$	.285
GE-217	600	150	25	48,000	$\frac{3}{8}$	.285
GE-800	125	300	25	96,000	$\frac{1}{2}$	.385
GE-800	500	75	25	24,000	$\frac{1}{4}$	.205
GE-800	500	49	22	31,500	$\frac{1}{4}$	.228
GE-800	250	150	25	48,000	$\frac{3}{8}$	.285
GE-1000	500	49	22	31,500	$\frac{1}{4}$	.228
GE-1000	250	200	25	64,000	$\frac{1}{2}$	.325

SINGLE CONDUCTOR CABLE FOR CAR WIRING

Flameproof Finish

FOR 1200 VOLT CIRCUITS

The conductors are standard sizes, with tinned wires and a separator between the rubber and the conductor; over the rubber a tape is applied (except on sizes 14 and 12 in which tape is omitted) then a compounded cotton braid and an asbestos braid filled with flameproof paint.

Sizes	No. of Strands	Bare Dia.	Thickness of Rubber in In.	Finished Diameter	Weight per 1000 Ft.
14	7	.073	$\frac{1}{32}$	.39	115
12	7	.092	$\frac{1}{32}$	.41	129
6	7	.184	$\frac{1}{32}$	.55	328
4	7	.232	$\frac{1}{32}$	.60	359
2	7	.292	$\frac{1}{32}$	.66	397
1	19	.332	$\frac{1}{32}$	.73	470
1/0	19	.375	$\frac{1}{32}$	.78	548
2/0	19	.419	$\frac{1}{32}$	.82	654
3/0	19	.470	$\frac{1}{32}$	.87	785
4/0	19	.528	$\frac{1}{32}$	.93	940

Weatherproof Finish

FOR UNLINED CONDUITS

The conductors are same as above except that a tape and weatherproof braid (in place of asbestos braid) is put on all sizes, thus making the cable suitable for unlined conduit use.

14	7	.073	$\frac{1}{32}$	.36	70
12	7	.092	$\frac{1}{32}$	.38	85
6	7	.184	$\frac{1}{32}$	.48	176
4	7	.232	$\frac{1}{32}$	.52	239
2	7	.292	$\frac{1}{32}$	.58	336
1	19	.332	$\frac{1}{32}$	.62	409
1/0	19	.375	$\frac{1}{32}$	.67	485
2/0	19	.419	$\frac{1}{32}$	.71	585
3/0	19	.470	$\frac{1}{32}$	.76	709
4/0	19	.528	$\frac{1}{32}$	.82	864

BELL MOUTHS AND GASKETS FOR CONDUIT WIRING

General Electric malleable iron bell mouths and soft rubber gaskets are used in making water-tight joints in any sort of pipe-conduit work, but are especially adaptable to railway car equipment work.

The gaskets are made of the best grade of soft black rubber and are manufactured in accordance with the U.S. Navy Standard Specification. They will not corrode or crumble.

DIRECTIONS FOR ORDERING BELL MOUTHS AND GASKETS

In placing orders for bell mouths and gaskets, it should first be determined from dimension "A," the size of bell mouth wanted, and the catalogue number which covers it. After having determined the size of bell mouth, reference should be made to the column "Type of Gasket" to find the form of gasket used with this size of bell mouth. Reference should then be made to the list of gaskets and a gasket selected with a hole having a diameter $\frac{1}{32}$ in. larger than the cable to be run.

Example.—If a 1 in. bell mouth Cat. No. 49289 is wanted, under column "Type of Gasket" it is found this bell mouth takes a Type "A" gasket. Supposing that the cable to be run is $\frac{1}{2}$ in. in diameter, A-20 gaskets should be ordered, and the order should read, Cat. No. 49289, 1 in. bell mouths and A-20 gaskets.

BELL MOUTHS

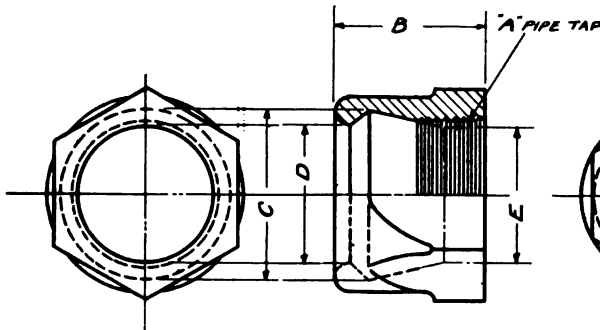


Fig. 1

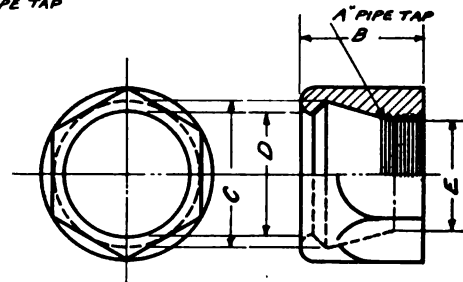


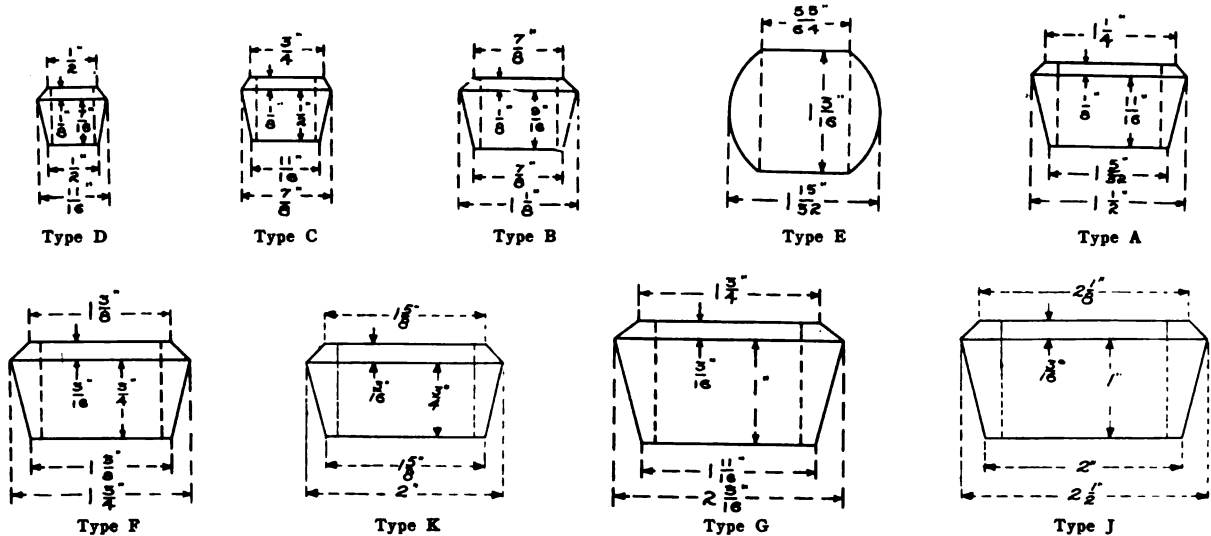
Fig. 2

DIMENSIONS IN INCHES

Fig.	Cat. No.	A	B	C	D	E	Type of Gasket
1	49287	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{19}{32}$	$\frac{25}{64}$	$\frac{11}{32}$	D
1	48256	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{23}{32}$	$\frac{29}{64}$	$\frac{13}{32}$	C
1	49288	$\frac{3}{4}$	1	$1\frac{1}{32}$	$\frac{33}{64}$	$\frac{15}{32}$	B
2	49289	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{5}{16}$	$1\frac{3}{8}$	A
1	48234	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	F
2	49291	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	G
1	49292	2	$1\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{1}{2}$	J

BELL MOUTHS AND GASKETS FOR CONDUIT WIRING

SOFT RUBBER GASKETS



DIMENSIONS IN INCHES

Type	HOLE		Type	HOLE		Type	HOLE		Type	HOLE		Type	HOLE		Type	HOLE	
	No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.
A-0	0	0	B-0	0	0	C-0	0	0	D-0	0	0	E-0	0	0	F-0	0	0
A-4	1	$\frac{1}{8}$	B-4	1	$\frac{1}{8}$	C-4	1	$\frac{1}{8}$	D-4	1	$\frac{1}{8}$	E-4	1	$\frac{1}{8}$	F-4	1	$\frac{1}{8}$
A-5	1	$\frac{1}{4}$	B-5	1	$\frac{1}{4}$	C-5	1	$\frac{1}{4}$	D-5	1	$\frac{1}{4}$	E-5	1	$\frac{1}{4}$	F-5	1	$\frac{1}{4}$
A-6	1	$\frac{3}{8}$	B-6	1	$\frac{3}{8}$	C-6	1	$\frac{3}{8}$	D-6	1	$\frac{3}{8}$	E-6	1	$\frac{3}{8}$	F-6	1	$\frac{3}{8}$
A-7	1	$\frac{1}{2}$	B-7	1	$\frac{1}{2}$	C-7	1	$\frac{1}{2}$	D-7	1	$\frac{1}{2}$	E-7	1	$\frac{1}{2}$	F-7	1	$\frac{1}{2}$
A-8	1	$\frac{5}{8}$	B-8	1	$\frac{5}{8}$	C-8	1	$\frac{5}{8}$	D-8	1	$\frac{5}{8}$	E-8	1	$\frac{5}{8}$	F-8	1	$\frac{5}{8}$
A-9	1	$\frac{3}{4}$	B-9	1	$\frac{3}{4}$	C-9	1	$\frac{3}{4}$	D-9	1	$\frac{3}{4}$	E-9	1	$\frac{3}{4}$	F-9	1	$\frac{3}{4}$
A-10	1	$\frac{7}{8}$	B-10	1	$\frac{7}{8}$	C-10	1	$\frac{7}{8}$	D-10	1	$\frac{7}{8}$	E-10	1	$\frac{7}{8}$	F-10	1	$\frac{7}{8}$
A-11	1	1	B-11	1	1	C-11	1	1	D-11	1	1	E-11	1	1	F-11	1	1
A-12	1	$1\frac{1}{8}$	B-12	1	$1\frac{1}{8}$	C-12	1	$1\frac{1}{8}$	D-12	1	$1\frac{1}{8}$	E-12	1	$1\frac{1}{8}$	F-12	1	$1\frac{1}{8}$
A-13	1	$1\frac{1}{4}$	B-13	1	$1\frac{1}{4}$	C-13	1	$1\frac{1}{4}$	D-13	1	$1\frac{1}{4}$	E-13	1	$1\frac{1}{4}$	F-13	1	$1\frac{1}{4}$
A-14	1	$1\frac{3}{8}$	B-14	1	$1\frac{3}{8}$	C-14	1	$1\frac{3}{8}$	D-14	1	$1\frac{3}{8}$	E-14	1	$1\frac{3}{8}$	F-14	1	$1\frac{3}{8}$
A-15	1	$1\frac{1}{2}$	B-15	1	$1\frac{1}{2}$	C-15	1	$1\frac{1}{2}$				E-15	1	$1\frac{1}{2}$	F-15	1	$1\frac{1}{2}$
A-16	1	$1\frac{5}{8}$	B-16	1	$1\frac{5}{8}$	C-16	1	$1\frac{5}{8}$				E-16	1	$1\frac{5}{8}$	F-16	1	$1\frac{5}{8}$
A-17	1	$1\frac{3}{4}$	B-17	1	$1\frac{3}{4}$	C-17	1	$1\frac{3}{4}$				E-17	1	$1\frac{3}{4}$	F-17	1	$1\frac{3}{4}$
A-18	1	$1\frac{7}{8}$	B-18	1	$1\frac{7}{8}$	C-18	1	$1\frac{7}{8}$				E-18	1	$1\frac{7}{8}$	F-18	1	$1\frac{7}{8}$
A-19	1	2	B-19	1	2	C-19	1	2				E-19	1	2	F-19	1	2
A-20	1	$2\frac{1}{8}$	B-20	1	$2\frac{1}{8}$	C-20	1	$2\frac{1}{8}$				E-20	1	$2\frac{1}{8}$	F-20	1	$2\frac{1}{8}$
A-21	1	$2\frac{1}{4}$	B-21	1	$2\frac{1}{4}$							E-21	1	$2\frac{1}{4}$	F-21	1	$2\frac{1}{4}$
A-22	1	$2\frac{3}{8}$	B-22	1	$2\frac{3}{8}$							E-22	1	$2\frac{3}{8}$	F-22	1	$2\frac{3}{8}$
A-23	1	$2\frac{1}{2}$	B-23	1	$2\frac{1}{2}$							E-23	1	$2\frac{1}{2}$	F-23	1	$2\frac{1}{2}$
A-24	1	$2\frac{5}{8}$	B-24	1	$2\frac{5}{8}$							E-24	1	$2\frac{5}{8}$	F-24	1	$2\frac{5}{8}$
A-25	1	$2\frac{3}{4}$	B-25	1	$2\frac{3}{4}$							E-25	1	$2\frac{3}{4}$	F-25	1	$2\frac{3}{4}$
A-26	1	$2\frac{7}{8}$	B-26	1	$2\frac{7}{8}$							E-26	1	$2\frac{7}{8}$	F-26	1	$2\frac{7}{8}$
A-27	1	3	B-27	1	3							E-27	1	3	F-27	1	3
A-28	1	$3\frac{1}{8}$										E-28	1	$3\frac{1}{8}$	F-28	1	$3\frac{1}{8}$
A-29	1	$3\frac{1}{4}$										E-29	1	$3\frac{1}{4}$	F-29	1	$3\frac{1}{4}$
A-30	1	$3\frac{3}{8}$										E-30	1	$3\frac{3}{8}$	F-30	1	$3\frac{3}{8}$
A-31	1	$3\frac{1}{2}$										E-31	1	$3\frac{1}{2}$	F-31	1	$3\frac{1}{2}$
A-32	1	$3\frac{5}{8}$										E-32	1	$3\frac{5}{8}$	F-32	1	$3\frac{5}{8}$
A-33	1	$3\frac{3}{4}$										E-33	1	$3\frac{3}{4}$	F-33	1	$3\frac{3}{4}$
A-34	1	$3\frac{7}{8}$										E-34	1	$3\frac{7}{8}$	F-34	1	$3\frac{7}{8}$
A-35	1	4										E-35	1	4	F-35	1	4
A-36	1	$4\frac{1}{8}$										E-36	1	$4\frac{1}{8}$	F-36	1	$4\frac{1}{8}$
															F-37	1	$4\frac{1}{4}$
															F-38	1	$4\frac{3}{8}$
															F-39	1	$4\frac{1}{2}$
															F-40	1	$4\frac{3}{4}$
															F-41	1	$4\frac{1}{2}$
															F-42	1	$4\frac{3}{4}$

BELL MOUTHS AND GASKETS FOR CONDUIT WIRING
SOFT RUBBER GASKETS
DIMENSIONS IN INCHES

Type			HOLE			Type			HOLE			Type			HOLE			Type			HOLE			Type			HOLE		
No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.		No.	Dia.	
AA-4	2	$\frac{1}{8}$	BB-4	2	$\frac{1}{8}$	CC-4	2	$\frac{1}{8}$	DD-4	2	$\frac{1}{8}$	EE-4	2	$\frac{1}{8}$	FF-4	2	$\frac{1}{8}$												
AA-5	2	$\frac{1}{8}$	BB-5	2	$\frac{1}{8}$	CC-5	2	$\frac{1}{8}$	DD-5	2	$\frac{1}{8}$				FF-5	2	$\frac{1}{8}$												
AA-6	2	$\frac{1}{8}$	BB-6	2	$\frac{1}{8}$	CC-6	2	$\frac{1}{8}$							FF-6	2	$\frac{1}{8}$												
AA-7	2	$\frac{1}{8}$	BB-7	2	$\frac{1}{8}$	CC-7	2	$\frac{1}{8}$							FF-7	2	$\frac{1}{8}$												
AA-8	2	$\frac{1}{8}$	BB-8	2	$\frac{1}{8}$	CC-8	2	$\frac{1}{8}$							FF-8	2	$\frac{1}{8}$												
AA-9	2	$\frac{1}{8}$	BB-9	2	$\frac{1}{8}$										FF-9	2	$\frac{1}{8}$												
AA-10	2	$\frac{1}{8}$	BB-10	2	$\frac{1}{8}$										FF-10	2	$\frac{1}{8}$												
AA-11	2	$\frac{1}{8}$	BB-11	2	$\frac{1}{8}$										FF-11	2	$\frac{1}{8}$												
AA-12	2	$\frac{1}{8}$							J-0	1	$\frac{1}{8}$				FF-12	2	$\frac{1}{8}$												
AA-13	2	$\frac{1}{8}$							J-33	1	$\frac{1}{8}$				FF-13	2	$\frac{1}{8}$												
AA-14	2	$\frac{1}{8}$							J-35	1	$\frac{1}{8}$				FF-14	2	$\frac{1}{8}$												
AA-15	2	$\frac{1}{8}$							J-36	1	$\frac{1}{8}$				FF-15	2	$\frac{1}{8}$												
AA-16	2	$\frac{1}{8}$							J-43	1	$\frac{1}{8}$				FF-16	2	$\frac{1}{8}$												
									J-44	1	$\frac{1}{8}$				FF-17	2	$\frac{1}{8}$												
									J-47	1	$\frac{1}{8}$				FF-18	2	$\frac{1}{8}$												
								CCC-5	3	$\frac{1}{8}$					FF-19	2	$\frac{1}{8}$												
									J-50	1	$\frac{1}{8}$				FF-20	2	$\frac{1}{8}$												
									J-51	1	$\frac{1}{8}$																		
									J-54	1	$\frac{1}{8}$																		
									J-57	1	$\frac{1}{8}$																		
									J-60	1	$\frac{1}{8}$																		
									J-61	1	$\frac{1}{8}$																		

APPROXIMATE NUMBER OF GASKETS PER POUND

Type of Gasket	No. in Pound	Type of Gasket	No. in Pound	Type of Gasket	No. in Pound	Type of Gasket	No. in Pound	Type of Gasket	No. in Pound
A- 0	19	AA- 8	21	C- 0	66	D-13	260	F-32	20
5	19	10	22	4	70	14	250	33	21
11	21	12	23	5	70	E- 8	14	34	23
12	20	14	23	6	73	12	14	35	24
13	20	16	27	7	78	16	15	36	27
14	20	17	54	8	77	24	20	37	29
15	21	18	55	9	77	30	26	38	30
16	21	19	58	10	80	32	30	39	30
17	21	B- 0	40	11	87	F- 0	12	40	32
18	22	6	44	C-12	92	13	13	F-41	35
19	23	15	50	13	97	14	13	42	37
20	23	12	50	14	104	15	13	43	38
21	24	B-13	52	15	110	16	14	FF- 5	12
22	25	8	46	16	100	17	14	12	13
23	27	9	46	17	120	18	14	13	13
24	29	10	48	18	128	19	13	14	14
25	31	20	61	20	133	20	14	15	14
26	32	21	66	CC- 4	81	21	15	16	14
27	33	22	75	6	76	22	15	17	16
28	32	23	82	D- 0	148	23	15	18	17
29	33	24	85	5	160	24	16	G-40	10
30	38	25	87	6	160	25	17	44	13
31	39	26	100	7	170	26	17	48	16
32	40	27	112	8	170	27	18	J-60	15
33	45	BB- 5	45	9	200	28	18	K-50	22
34	50	9	50	10	210	29	18		
35	53	10	55	11	220	30	19		
36	57	11	57	12	230	31	19		

CONNECTORS AND CLEATS

BRASS WIRE CLEATS

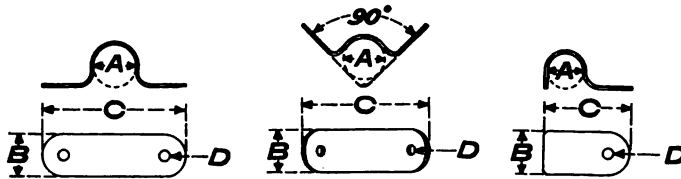


Fig. 1

Fig. 2

Fig. 3

WOOD CLEATS

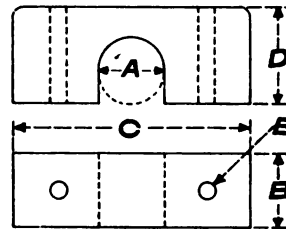


Fig. 4

Cat. No.	Fig.	DIMENSIONS IN INCHES			
		A	B	C	D
15118	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
21680	3	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15100	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15102	2	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15103	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15104	2	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15108	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	No. 9 Drill
15116	2	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{2}$	No. 9 Drill
26953	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	No. 9 Drill
26954	2	$1\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	No. 9 Drill
26955	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	No. 9 Drill
26956	1	$1\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	No. 10 Drill

Cat. No.	DIMENSIONS IN INCHES—FIG. 4				
	A	B	C	D	E
15285	$1\frac{1}{8}$	$3\frac{1}{2}$	2	$1\frac{1}{2}$	$1\frac{1}{2}$
15286	$1\frac{1}{8}$	$3\frac{1}{2}$	2	$1\frac{1}{2}$	$1\frac{1}{2}$
15287	$1\frac{1}{8}$	$3\frac{1}{2}$	2	$1\frac{1}{2}$	$1\frac{1}{2}$
15288	$1\frac{1}{8}$	$3\frac{1}{2}$	2	$1\frac{1}{2}$	$1\frac{1}{2}$
15289	$1\frac{1}{8}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
15298	$1\frac{1}{8}$	1	3	$1\frac{1}{2}$	$1\frac{1}{2}$

BRASS TWO-WAY CONNECTORS

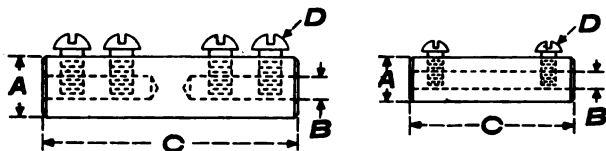


Fig. 6

Fig. 7

Cat. No.	Fig.	DIMENSIONS IN INCHES			
		A	B	C	D
10696	6	$1\frac{1}{8}$	$1\frac{1}{8}$	3	14-24, $1\frac{1}{8}$
10697	6	$1\frac{1}{8}$	$1\frac{1}{8}$	$2\frac{1}{2}$	14-24, $1\frac{1}{8}$
10698	6	$1\frac{1}{8}$	$1\frac{1}{8}$	$2\frac{1}{2}$	14-24, $1\frac{1}{8}$
10699	7	$1\frac{1}{8}$	$1\frac{1}{8}$	1	8-32, $1\frac{1}{8}$
10918	7	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	4-32, $1\frac{1}{8}$

BRASS CLAMP CONNECTORS

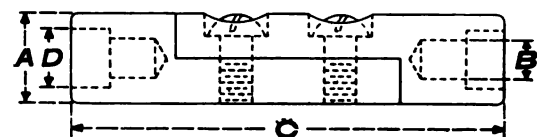


Fig. 5

Cat. No.	DIMENSIONS IN INCHES—FIG. 5			
	A	B	C	D
11375	$1\frac{1}{8}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{1}{8}$
11376	$1\frac{1}{8}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{1}{8}$
11377	$1\frac{1}{8}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{1}{8}$
11378	$1\frac{1}{8}$	$1\frac{1}{8}$	$5\frac{1}{2}$	$1\frac{1}{8}$
11379	1	$1\frac{1}{8}$	6	$1\frac{1}{8}$
11380	$1\frac{1}{8}$	$1\frac{1}{8}$	$6\frac{1}{2}$	$1\frac{1}{8}$
11381	$1\frac{1}{8}$	$1\frac{1}{8}$	6	1
11382	$1\frac{1}{8}$	$1\frac{1}{8}$	6	$1\frac{1}{8}$
11383	$1\frac{1}{8}$	$1\frac{1}{8}$	6	$1\frac{1}{8}$

BRASS CLASP CONNECTORS

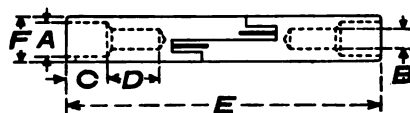


Fig. 2

BRASS CLASP CONNECTORS

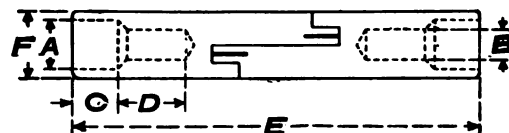


Fig. 3

Cat. No.	DIMENSIONS IN INCHES—FIG. 2					
	A	B	C	D	E	F
61910	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$6\frac{3}{4}$	$1\frac{1}{8}$
49111	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$6\frac{3}{4}$	$1\frac{1}{8}$
49110	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$5\frac{1}{2}$	1
49109	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$5\frac{1}{2}$	$1\frac{1}{8}$
49108	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{1}{8}$

Cat. No.	DIMENSIONS IN INCHES—FIG. 3					
	A	B	C	D	E	F
49113	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{1}{8}$
49112	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	3	$1\frac{1}{8}$

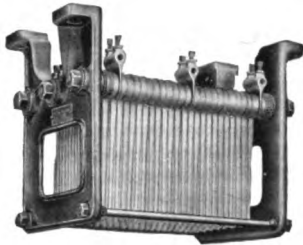
*** RHEOSTATS FOR CAR EQUIPMENTS** **TYPE CG**

Controller	Motors	Standard Rheostat Equipment	Connection Diagram
K	2 GE-800	{ 1 CG-14A24 1 CG-14A8-11A16 1 A-3 shunt	} DS-3902
K-2	{ 2 GE-800 2 GE-1200	{ 1 CG-14A24 1 CG-14A6 -12A13-11A5 1 A-3 shunt	} DS-3897
K-6	{ 4 GE-67 4 GE-58 4t	{ 1 CG-8A18 1 CG-9B18 1 CG-11A24	} DS-1867
K-10	{ 2 GE-800 2 GE-52 2 GE-54 2 GE-58 6t	{ 1 CG-14A24 1 CG-12A11-11A13	} DS-3163
K-10	{ 2 GE-1000 2 GE-58 4t 2 GE-67	{ 1 CG-13A24 1 CG-12A10-10A11	} DS -2503
K-11	2 GE-57	{ 1 CG-9A18 1 CG-11A24	} DS-1871
K-12	{ 4 GE-54 4 GE-58 6t 4 GE-60 4t	{ 1 CG-9A18 1 CG-11A24	} DS-1871
K-12	{ 4 GE-800 4 GE-52 4 GE-60 6t	{ 1 CG-12A24 1 CG-10A9-9A9	} DS-2055
K-14	4 GE-57	{ 1 CG-6A18 1 CG-7A18 1 CG-8B18 1 CG-10A18 or (depending on service conditions) 1 CG-10A12-6A6 1 CG-6A18 1 CG-4A12-7B6 1 CG-7B8-6B10	{ DS-1843 } DS-3301
K-28	{ 4 GE-70 4 GE-1000 4 GE-67 4 GE-58 4t	{ 1 CG-9A13-10A5 1 CG-10A15-8A3 1 CG-8A18 or (depending on service conditions) 1 CG-8A18 1 CG-8A3-10A9-6A6 1 CG-6A18	{ DS-4270 } DS-4520

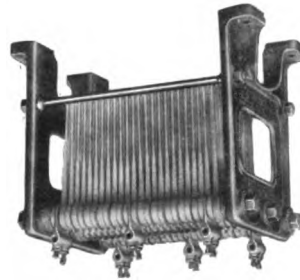
*Rheostats suitable for car equipments other than those given in the table will be recommended on request. Such request should contain information as to the following: Gear ratio, horse-power and make of motors, diameter of car wheels and weight of car.

RHEOSTATS FOR CAR EQUIPMENTS

TYPE CG



Form A Frame



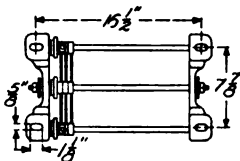
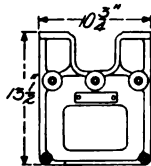
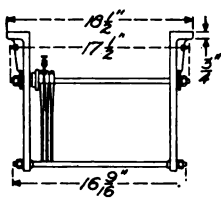
Form C Frame

TYPE CG RHEOSTATS—FORM A

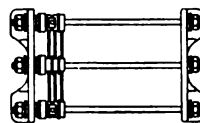
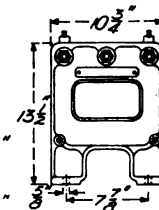
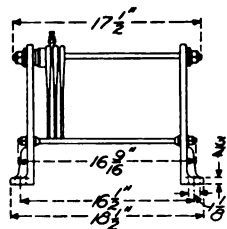
In the following list of rheostats will be found combinations suitable for practically all requirements.

4A18	7A18	11A24	7B10-6B8	11A9-9A11	14A8-11A16
4B18	7B18	11B24	9A13-10A5	11A12-8A9	8A3-10A9-6A6
4C18	7C18	12A24	10A9-9A9	11A19-9A3	8A7-6A5-7B6
5A18	8A18	13A24	10A12-6A6	11A20-14A4	12A3-10A9-8A6
5B18	8B18	14A24	10A13-11A6	12A10-10A11	12A6-12B8-11B10
5C18	9A18	4A12-7B6	10A15-8A3	12A11-11A13	12A8-11A8-8A6
6A18	9B18	7B8-6B10	10B16-7B2	14A8-10A12	14A6-12A13-11A5
6B18	10A18				

DIMENSIONS



Form A



Form C

NOMENCLATURE

The following explanation of the nomenclature of the CG Rheostats, will permit of the exact determination from the rating of a rheostat, of the size or sizes of grids employed in its construction and all facts regarding connections, etc. A clear understanding of this nomenclature will be of considerable assistance in handling repair part business.

Each rheostat is designated by the type letters CG followed by a group or groups of symbols, the groups, where there are more than one, being separated by dashes. The symbols in each group consist of three parts, *viz*:

1st Part—A figure indicating the size of the grids in the group. The grids are numbered in serial order in sequence of their resistances, their serial numbers corresponding with their catalogue numbers.

RHEOSTATS FOR CAR EQUIPMENTS

TYPE CG—(Concluded)

2nd Part—A letter indicating the way in which the grids are connected within the group, "A" indicating that the grids are connected in series, "B" indicating that two grids are connected in multiple, the pairs in series, "C" three grids in multiple. In each case the sets are connected in series.

3rd Part—A figure indicating the number of grids in the group.

Illustrating the above, CG-8A18 is a rheostat composed entirely of No. 8 grids connected in series and containing 18 grids.

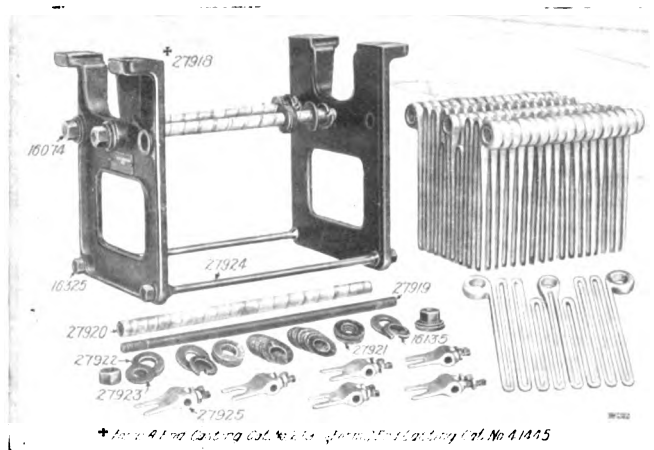
CG-8B18 is a rheostat composed entirely of No. 8 grids connected two in multiple and containing 18 grids. CG-8C18 indicates that the same grids are used, but that they are connected three in multiple.

CG-4A12-7B6 indicates that the rheostat contains 12 No. 4 grids connected in series and six No. 7 grids connected two in multiple and the groups connected in series.

Cat. Nos. are not assigned to complete CG rheostats as the number of possible resistance combinations is practically infinite and each rheostat is fully identified by its descriptive symbol.

TYPE CG RHEOSTAT GRIDS

Cat. No.	No. of Grids per Rheostat	Size No. of Grid	Resis. per Grid at 70° C.	AMPERES		Weights in Lb. per 100 Grids
				Continuous Cap. at 175° C. Rise	Intermit. Cap. on 10 Sec. off 20 Sec. at 250° C. Rise	
26504	18	4	.023	75	150	420
26505	18	5	.030	68	135	360
26506	18	6	.038	60	120	290
26507	18	7	.047	55	105	260
26508	18	8	.059	50	90	200
26509	18	9	.074	45	80	175
26510	18	10	.092	40	70	200
26511	24	11	.092	35	65	190
26512	24	12	.113	33	60	175
26513	24	13	.142	31.5	55	160
26514	24	14	.177	30	50	138



Parts of Type CG Rheostat

RHEOSTATS FOR CAR EQUIPMENTS**TYPE CG RHEOSTAT GRIDS—(Concluded)****FORM A**

The following is a complete list of parts, which are the same for all Form A-CG Rheostats:

No. Required	Cat. No.	Description
2	27918	End Casting
3	27919	Rod for grids
2	27924	Tie Rod
3	27920	Mica Insulating Tube
5	27925	Terminal complete with set screws
*	27921	Mica Washer, $\frac{3}{8}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "
6	27922	Steel Washer, $\frac{11}{16}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "
6	16135	Lock Washer
6	27923	Steel Washer, $\frac{11}{16}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "
6	16074	Hexagonal Nut, $\frac{3}{4}$ "-11
4	16325	Hexagonal Nut, $\frac{3}{4}$ "-13

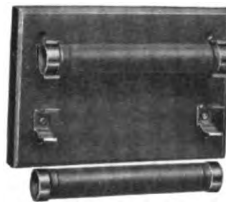
* The number of mica washers depends upon the number and arrangement of grids.

FORM C

Form C Rheostats take the same frame parts as the Form A, except that end castings Cat. No. 41445 are used in place of Cat. No. 27918.

INSULATED SUPPORTING BOLTS

Cat. No.	Description
48804	Insulated bolt ($\frac{1}{2}$ "-13, 4" long) complete with nut and washers for fastening CG Rheostats Form A or C to steel frame cars

TYPE CR 188 FORM PM RESISTANCE TUBES

CR 188 Resistance Units
With Fuse Clips Cat. No. 58728

A new and particularly durable form of resistance tube for use in the control circuits of Sprague Multiple Unit Railway Equipments is known as Type CR 188, Form PM. It consists of a strongly made cylinder, treated inside and out with a special insulating compound about which a resistance wire having a negligible temperature coefficient, is wound under tension sufficient to embed it in the insulating surface. Metal end bushings, which serve to give contact in the supporting clips, are attached to the winding by mechanical grips, no solder being used. Standard fuse holder clips as specified by the Underwriters' National Electrical Code are used to support the tube.

The Unit complete is fire and moisture proof and its resistance value is practically unchangeable regardless of temperature.

The tubes are furnished in three sizes, A, B & C measuring respectively $5\frac{1}{2}$ in., $7\frac{1}{2}$ in. and $11\frac{1}{2}$ in. long, and all of them 1 in. in diameter. The resistance in ohms is stamped on each tube and in ordering it is sufficient to state the size and resistance rating of the tube to be replaced.

RHEOSTATS FOR CAR EQUIPMENTS

TYPE CR 188 FORM PM RESISTANCE TUBES—(Concluded)

RATING

SIZE A 5½ in. long, 1 in. diam. Capacity: 100 Watts for continuous duty			SIZE B 7½ in. long, 1 in. diam. Capacity: 150 Watts for continuous duty			SIZE C 11½ in. long, 1 in. diam. Capacity: 200 Watts for continuous duty		
Symbol	Ohms	Amperes Continuous	Symbol	Ohms	Amperes Continuous	Symbol	Ohms	Amperes Continuous
.25 A	.25	20	.25 B	.25	24.5	.1 C	.10	45
.3 A	.30	18.3	.3 B	.30	22.4	.2 C	.20	32
.4 A	.40	15.8	.4 B	.40	19.4	.3 C	.30	26
.5 A	.50	14.2	.5 B	.5	17.3	.4 C	.40	22
.75 A	.75	11.5	.75 B	.75	14.1	.5 C	.50	20
1 A	1	10	1 B	1	12.2	.6 C	.60	18
1.25 A	1.25	9	1.25 B	1.25	11	.75 C	.75	16
1.5 A	1.5	8.1	1.5 B	1.5	10	1 C	1	14
2 A	2	7	2 B	2	8.7	1.25 C	1.25	12.5
2.5 A	2.5	6.3	2.5 B	2.5	7.8	1.5 C	1.5	11.5
3 A	3	5.8	3 B	3	7	1.75 C	1.75	10.7
4 A	4	5	4 B	4	6.1	2 C	2	10
5 A	5	4.5	5 B	5	5.5	2.5 C	2.5	9
7.5 A	7.5	3.6	7.5 B	7.5	4.5	3 C	3	8.2
10 A	10	3.2	10 B	10	3.9	3.5 C	3.5	7.5
15 A	15	2.6	15 B	15	3.2	4 C	4	7
20 A	20	2.2	20 B	20	2.7	5 C	5	6.3
25 A	25	2	25 B	25	2.5	7.5 C	7.5	5.2
35 A	35	1.7	35 B	35	2	10 C	10	4.5
45 A	45	1.5	45 B	45	1.8	12 C	12	4
50 A	50	1.4	50 B	50	1.7	15 C	15	3.6
60 A	60	1.3	60 B	60	1.6	20 C	20	3.1
75 A	75	1.15	75 B	75	1.4	25 C	25	2.8
100 A	100	1	100 B	100	1.2	30 C	30	2.6
125 A	125	.9	125 B	125	1.1	45 C	45	2.1
150 A	150	.81	150 B	150	1	50 C	50	2
200 A	200	.7	175 B	175	.93	75 C	75	1.6
300 A	300	.58	200 B	200	.87	100 C	100	1.4
500 A	500	.45	250 B	250	.77	125 C	125	1.25
700 A	700	.38	300 B	300	.7	150 C	150	1.15
1000 A	1000	.32	350 B	350	.65	200 C	200	1
2000 A	2000	.22	400 B	400	.61	225 C	225	.95
3500 A	3500	.17	500 B	500	.55	250 C	250	.9
			600 B	600	.5	300 C	300	.82
			700 B	700	.46	325 C	325	.78
			800 B	800	.43	350 C	350	.75
			900 B	900	.41	375 C	375	.73
			1000 B	1000	.39	400 C	400	.71
			1200 B	1200	.35	450 C	450	.67
			1400 B	1400	.33	500 C	500	.63
			1600 B	1600	.31	600 C	600	.58
			1800 B	1800	.29	700 C	700	.53
			2000 B	2000	.27	800 C	800	.5
			3000 B	3000	.22	1000 C	1000	.45
			4000 B	4000	.19	1200 C	1200	.41
			5000 B	5000	.17	1400 C	1400	.38
						1600 C	1600	.35
						1800 C	1800	.33
						4800 C	4800	.2
						5000 C	5000	.2

Cat. No.

Description

*58728

Fuse holder (including clip, screw, nuts and washers)

* Two fuse holders are necessary to each resistance tube.

CAR LIGHTING FIXTURES

GE ALL-PORCELAIN WIRELESS CLUSTERS



Cat. No. 40519



Cat. No. 44166

These All-Porcelain Clusters conform to reflectors, shades or ceilings, and have no metal shells to tarnish or come in contact with conducting parts. Covers can be removed and replaced, after connecting up, without the aid of a screwdriver. This saves time in installing. Flange plates for connecting to $\frac{3}{8}$ in. iron pipe make the clusters suitable for suspension or fixture work. The clusters are adapted for use with standard cluster shadeholders.

Cat. No.	Description	Std. Pkg.
40517	Two light, multiple, for attachment to ceiling	25
45208	Two light, multiple, with flange for fixtures	25
40518	Two light, series, for attachment to ceiling	25
45209	Two light, series, with flange for fixtures	25
44165	Flange only, tapped $\frac{3}{8}$ " pipe, for two light cluster, series or multiple	25
40519	Three light, multiple, for attachment to ceiling	25
45210	Three light, multiple, with flange for fixtures	25
40520	Three light, series, for attachment to ceiling	25
45211	Three light, series, with flange for fixtures	25
44166	Flange only, tapped $\frac{3}{8}$ " pipe, for three light cluster, series or multiple	25
40521	Five light, multiple, for attachment to ceiling	25
45212	Five light, multiple, with flange for fixtures	25
40522	Five light, series, for attachment to ceiling	25
45213	Five light, series, with flange for fixtures	25
44167	Flange only, tapped $\frac{3}{8}$ " pipe, for five light cluster, series or multiple	25

COMBINATION FLANGE AND SHADEHOLDER ATTACHMENT FOR ALL-PORCELAIN CLUSTERS



Cat. No. 40556



Cat. No. 16527

40556	Flange and shadeholder attachment, complete with rubber rings, for clusters, Cat. Nos. 40517, 40518, 40519, 40520, 40521, 40522	25
16527	Opal porcelain shade, 14" diam., for use with Cat. No. 40556	25

CLUSTERS FOR STREET CAR LIGHTS

FOR USE WITH STANDARD LAMP SOCKETS WITH $\frac{3}{8}$ IN. NOZZLES



Cat. No. 16425

Cat. No.	Description
14306	Two light, complete
16425	Three light, complete
14307	Four light, complete
14308	Five light, complete

These clusters are designed to take the porcelain shade Cat. No. 16527. Each cluster is complete with back plate, cluster body and rubber rings to cushion the shade.

The shade and sockets are not included in the list prices given above. See page 351, for Cat. No. 50768 sockets.

CAR LIGHTING FIXTURES

FIXTURES FOR 500 VOLT SOCKETS



Cat. Nos.
50705 and 50702



Cat. Nos.
50707 and 50702



Cat. Nos.
50708 and 50702



Cat. Nos.
50706 and 50702

Cat. No.	Description	Std. Pkg.	Cat. No.	Description	Std. Pkg.
50705	One light support, for sockets Nos. 50701, 50702, 32440, 32442	25	50707	Two light cluster, for Nos. 50701, 50702, 32440, 32442	25
50706	One light pilot bracket, for Nos. 50701, 50702, 32440, 32442	25	50708	Three light cluster, for Nos. 50701, 50702, 32440, 32442	25
			38938	Three light cluster, for Nos. 25709, 25710, 32441, 32443	25

The Cat. No. of the fixture does not include sockets.
Fixtures not adapted for shades.

KEYLESS, FOR 500 VOLT CIRCUITS



Cat. No. 50702



Cat. No. 59324

Cat. No.	Description	Std. Pkg.
	Shell and Cap—Threaded Connection	
50701	With aluminum shell, for $\frac{1}{4}$ " pipe	50
25709	With aluminum shell, for $\frac{1}{4}$ " pipe	50
50702	With brass shell, for $\frac{1}{4}$ " pipe	50
25710	With brass shell, for $\frac{1}{4}$ " pipe	50
	Shell and Cap—Bayonet Connection	
32440	With aluminum shell, for $\frac{1}{4}$ " pipe	50
32441	With aluminum shell, for $\frac{1}{4}$ " pipe	50
32442	With brass shell, for $\frac{1}{4}$ " pipe	50
32443	With brass shell, for $\frac{1}{4}$ " pipe	50
59323	With aluminum shell, male thread, $\frac{1}{4}$ " pipe	50
59324	With brass shell, male thread, $\frac{1}{4}$ " pipe	50

Regularly furnished with phosphor bronze spring center contacts. Can be furnished with flat washer contact on special order.

CAR LIGHTING FIXTURES

SOCKETS FOR 220 VOLT CIRCUITS



Cat. No. 50768



Cat. No. 50770



Cat. No. 50771

Order by the package if possible.

Cat. No.	Description	Std. Pkg.
50768	For $\frac{3}{4}$ " pipe	250
50770	With acorn shell, for $\frac{3}{4}$ " pipe	100
50771	With removable ring, for $\frac{3}{4}$ " pipe	250

RECEPTACLES



Cat. No. 49355



Cat. No. 9185



Cat. No. 60019



Cat. No. 60020

9185	Keyless receptacle, porcelain base	250
50717	Keyless receptacle, closed base	250
49355	Keyless receptacle, slotted base	250
60019	Keyless receptacle, concealed base	250
60020	Keyless receptacle, large concealed base	100
66320	Keyless receptacle, large concealed base	100
88258	Keyless receptacle, closed base	250

NOTE.—All these receptacles are designed especially for use where there is considerable vibration—the shells are held in place by screws which clamp them firmly to the base and make the use of screw rings unnecessary. Cat. No. 66320 receptacle is similar in appearance to Cat. No. 60020—the base is made with a larger recess in the back to accommodate No. 12 asbestos covered wire and the contacts are provided with large headed binding screws. Cat. No. 88258 receptacle is similar to Cat. Nos. 50717 and 49355—the base is smaller in diameter and is made to fit into special outlet boxes used in steel cars.

50745	With removable ring and porcelain base, 2" diam.	250
35780	With removable ring and chocolate colored porcelain base, 2" diam.	250
50786	With removable ring and chocolate colored porcelain base, 2 $\frac{1}{4}$ " diam.	250
50746	With removable ring and concealed base	250
50785	Large, with removable ring and concealed base	100

CAR LIGHTING FIXTURES

CONDUIT BOX RECEPTACLES



Cat. No. 62357



Cat. No. 49354



Cat. No. 60931

Cat. No.	Description	Std. Pkg.
49354	Keyless conduit box, for attaching to bottom of box	250
43501	Keyless conduit box, large flange to form cover, 3 holes for supporting screws	250
62357	Keyless conduit box, large flange to form cover, 2 holes for supporting screws to fit any standard 3 1/4" box	250
60931	Keyless conduit box, for attaching to cover of box	250

EDISON SOCKET RINGS



Cat. No. 50846



Cat. No. 31796



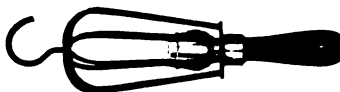
Cat. No. 9399



Cat. No. 50866

50846	Composition ring, double flange	100
31796	Composition ring, single flange	100
50866	Porcelain ring, single flange	100
9399	Soft rubber ring, for weatherproof sockets	100

PORTABLE LAMP GUARDS



Cat. No. 42681

42681	With keyless socket, Cat. No. 32440, extra heavy steel ribbon guard	25
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CAR LIGHTING FIXTURES

SEPARABLE ATTACHING PLUGS AND RECEPTACLES



Cat. No. 58983



Cat. No. 49488



Cat. No. 49489

Cat. Nos. 49487
and 58730

Cat. No. 59071



Cat. No. 59805

Cat. No.	Description	Std. Pkg.
42456	Attaching plug, Edison base, fuseless, with separable cover (porcelain)	250
58729	Attaching plug, Edison base, fuseless, with separable cover (moulded material)	100
49488	Cleat receptacle, porcelain to take plug Cat. No. 49487 (porcelain) or Cat. No. 58730 (moulded material)	100
49489	Concealed receptacle, porcelain to take plug Cat. No. 49487 (porcelain) or Cat. No. 58730 (moulded material)	100
49490	Flush receptacle, to take plug Cat. No. 49487 (porcelain) or Cat. No. 58730 (moulded material)	50
49491	Flush plate 4 1/2" x 2 1/4" for Cat. No. 49490	50
49487	Porcelain plug, two finger contacts, to fit above receptacles and attaching plug Cat. No. 42456	100
58730	Moulded material plug, two finger contacts, to fit above receptacles and attaching plug Cat. No. 42456	100
58953	Combined socket and attaching plug, two finger contacts, to fit above receptacles and Cat. No. 42456 attaching plug	100
59805	Combined socket and separable attaching plug, porcelain, Edison base, fuseless	100
59071	Stage connector	100

Cat. Nos.
42456 and
58729

600 VOLT SNAP SWITCHES



Cat. No. 61179



Cat. No. 21644

Cat. No.	Description	Std. Pkg.
21644	3-way snap switch, porcelain, 3 amp., 500 volt	10
21645	S.P. snap switch, porcelain, 3 amp., 500 volt	10
27682	Combined switch and cutout, 3 amp., 600 volt, without fuse	25
61179	Combined switch and cutout, 3 amp., 600 volt, without fuse	50
28839	Enclosed fuse, 3 amp., 600 volt, for use in Cat. Nos. 27682 and 61179	100

NOTE: Cat. No. 61179 combined snap switch and enclosed fuse cut-out is similar to Cat. No. 27682 except that the power is more rugged in construction and is specially designed to withstand the severest conditions of service.

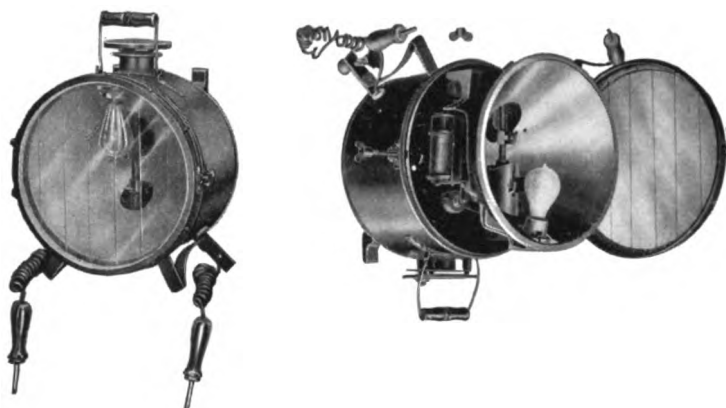
HEADLIGHTS

LUMINOUS ARC FOR D.C. INTERURBAN RAILWAYS

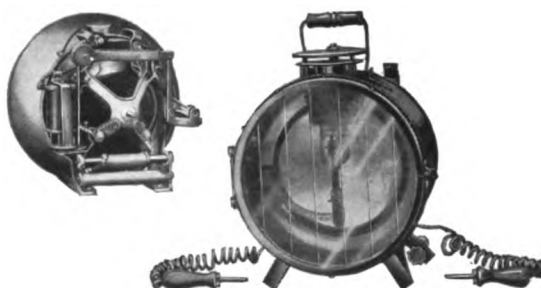
The headlights throw a very broad beam of light.



Dimmed Light Obtained by Reversing Current Through Arc



Dim Light Obtained by Incandescent Lamp

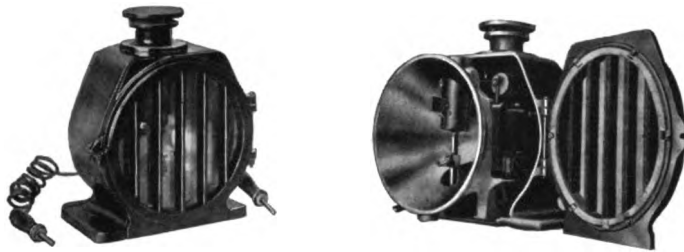


Dim Light Obtained by Reversing Current Through Arc

Cat. No.	Description
58037	Headlight with plugs, cable, steadying and dimming resistance
58038	Street car headlight with plug and cable, without resistance
65853	Headlight with mangin mirror, plugs, cable, steadying and dimming resistance
65854	Street car headlight with mangin mirror, plugs and cable, without resistance
65855	Headlight with incandescent lamp, plugs, cable and steadying resistance
65858	Street car headlight with incandescent lamp, plugs and cable, without resistance
61322	Steadying resistance
61323	Steadying and dimming resistance combined
53701	Substitutional resistance
59162	Enclosed reversing switch

HEADLIGHTS

LUMINOUS ARC FOR MINE LOCOMOTIVES



Form E Mine Headlight

Cat. No.	Description
60137	Luminous arc mine headlight with plug, cable and steadying resistance
60138	Luminous arc mine headlight with plug and cable, without steadying resistance
61328	Steadying resistance for 550 volts

This headlight has not the reversing feature. It throws a very broad beam of light.

INCANDESCENT FOR MINE LOCOMOTIVES



100545	250 volt incandescent headlight, complete
100546	500 volt incandescent headlight, complete

RAILWAY MOTOR ARMATURES

Motor	Cat. No.	Turns	Volts	Motor	Cat. No.	Turns	Volts
NWP2½	100352	14	250	GE58 & CO2004	66338	2	250
CB14	100353	26	500		66340	3	250
	51991	10	250		50453	4	500
CB15	51990	17	500		50454	6	500
	30780	16	250	GE59	61046	3	250
WP30	30781	30	500		61048	4	500
	16659	Standard	500		100354	6	500
WP50	16660	Standard	500		52379	2	250
GE800 & CO2005	108538	1	125	GE60	52380	3	250
	108539	2	250		52377	4	500
	e18223	3	500		52378	6	500
	e18224	4	500		39387	4	250
	f19344	3	500	GE61	39388	4	500
	f19345	4	500		24869	1	500
GE1000	108540	6	500	GE66	55870	3	500
	14793	3	500		47807	4	500
	14794	4	500	GE67	61049	1	500
	108541	1	250		61050	1	600
GE1200	b18063	2	500	GE69	34083	3	500
	b18064	3	500		32398	2	500
	b18065	4	500	GE70	35196	2	500
	a18030	2	500		61051	3	250
GE51 & CO2001	a18031	3	500	GE73	61052	6	500
	a18032	4	500		66342	3	500
	108531	1	250	GE74	61053	3	250
	61045	2	500		61054	6	500
	47902	2	250	GE77	40406	3	500
	47903	3	250		46598	3	500
GE52 & CO2002	14583	4	500	GE80	46064	2	500
	24907	5	500		107620	3	500
	14584	6	500	GE81	45342	2	500
	52593	2	250		66343	7	250
GE53	52589	3	500	GE87	61055	3	250
	52590	4	500		61056	6	500
	52591	5	500	GE88	61057	2	250
	52592	6	500		61058	2	500
GE54	11351	3	500	GE89	60340	3	600
	108532	1	250		66344	2	600
GE55 & CO2003	c50587	1	500	GE202	64297g	2	600
	d50588	1	500		100355h	2	600
	49042	2	500	GE204	49735	2	600/1200
	108533	3	500		64296	2	1200
	108534	1	250	GE205	107621	1	600
	108535	2	250		107622	1	600/1200
GE57 & CO2007	19220	2	500	GE207	59892	3	600
	50257	3	500		59149	3	600
	108536	4	500	GE210	61177	3	600
	21491	6	500		107623	3	600/1200
				GE213	107624	3	600
					108537	3	600
				GE216			
				GE217			
				GE218			
				GE219			

a Armature coils have flexible leads.

b Armature coils have stiff leads.

c Tape insulated coils.

d Mica insulated coils.

e Coils wound with No. 10 wire.

f Coils wound with No. 9 wire.

g Armature has 25 coils.

h Armature has 41 coils.

RAILWAY MOTOR ARMATURE COILS

Armature coils furnished by the General Electric Company, being taken from the same stock as coils for use in original equipments, are perfectly interchangeable, and fit accurately in the slot, which is necessary to avoid either abrasion in winding or destructive vibration in service.

The individual conductors are insulated with a double cotton covering 33% heavier than the covering of standard magnet wire, which provides a very elastic insulating cushion and greatly reduces liability to abrasion between adjacent turns.

The slot portion of all armature coils is moulded in steam heated presses to exact dimensions and in no other way is it possible to provide against vibration in the slot and consequent deterioration of the insulation in service.

Except in bar wound coils for certain of the larger motors in which mica is employed, the insulation of the complete coil is accomplished by the use of varnished cambric manufactured expressly for the purpose, and customers are particularly warned against coils for wire wound General Electric motors with a paper and thin mica insulation which have been offered on the theory of the fireproof character of the mica. Mica cannot safely be used in a wire wound armature coil because of the danger of cracks from bending of the coils in winding and from vibration in service.

In General Electric motors in which bar wound mica insulated coils are used such danger is avoided by the stiffness and manner of winding of the conductor, and by a minimum thickness of .039 in. of mica between conductor and core.



Fig. 1



Fig. 4

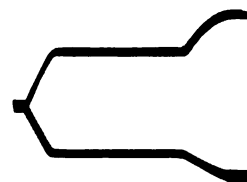


Fig. 6



Fig. 2



Fig. 5

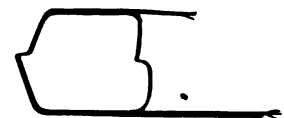


Fig. 3

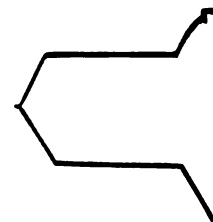


Fig. 7

GE800 AND CO2005

Cat. No.	Turns	Voltage	Conductor	Coils Per Set	Illustration Fig. No.
27385	1	125	(4) No. 10 B.&S.	105	5
27387	2	250	(2) No. 10 B.&S.	105	3
△ 17275	3	500	† No. 10 B.&S.	105	3
△ 17472	4	500	† No. 10 B.&S.	105	3
△ 15170	3	500	No. 10 B.&S.	105	3
§ 15161	3	500	† No. 10 B.&S.	105	3
§ 15173	4	500	† No. 10 B.&S.	105	3
* 59479	4	500	† No. 10 B.&S.	105	3
§ 18221	3	500	No. 10 B.&S.	105	3
§ 18222	4	500	No. 10 B.&S.	105	3
† 60309	4	500	No. 10 B.&S.	105	3
§ 19346	3	500	† No. 9 B.&S.	105	3
§ 19347	4	500	† No. 9 B.&S.	105	3
15204	6	500	† .10" x .063"	105	3

* Like Cat. No. 15173 except leads are not flattened.

† Light Insulation.

‡ Like Cat. No. 18222 except leads are not flattened.

△ Flexible leads.

§ Stiff leads.

RAILWAY MOTOR ARMATURE COILS

GE1000

Cat. No.	Turns	Voltage	Conductor	Coils Per Set	Illustration Fig. No.
14778	3	500	No. 9 B.&S.	93	1
14779	4	500	No. 9 B.&S.	93	1

GE1200

24971	1	250	(3) (.105" x .15")	105	5
△ 18098	2	500	(2) No. 10 B.&S.	105	3
△ 18099	3	500	No. 10 B.&S.	105	3
△ 18189	4	500	No. 10 B.&S.	105	3
§ 18068	2	500	(2) No. 9 B.&S.	105	3
§ 18069	3	500	.105" x .15"	105	3
§ 18070	4	500	No. 9 B.&S.	105	3

GE51 AND CO2001

24915	1	250	(4) No. 7 B.&S.	37	7
24917	2	500	(2) No. 7 B.&S.	37	2

GE52 AND CO2002

24919	2	250	(3) No. 11 B.&S.	29	2
24921	3	250	(2) No. 11 B.&S.	29	2
14585	4	500	No. 10 B.&S.	29	2
24908	5	500	No. 10 B.&S.	29	2
14586	6	500	No. 11 B.&S.	29	2

GE53

55759	2	250	(2) No. 8 B.&S.	33	2
55755	3	500	(2) No. 10 B.&S.	37	2
55756	4	500	No. 8 B.&S.	33	2
55757	5	500	No. 8 B.&S.	33	2
55758	6	500	No. 10 B.&S.	37	2

GE54

11352	3	500	No. 10 B.&S.	29	2
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GE55 AND CO2003

*50591	1	500	No. 19 B.&S.	47	6
†50592					
*24931					
†24932					
*24929					
†24930	1	500	No. 19 B.&S.	47	6
*50593					
†50594					
*24935	1	250	.187" x .50"	31	6
†24936					
24940	2	500	(3) No. 10 B.&S.	47	2
24944	3	500	(2) No. 10 B.&S.	47	2

* Upper coil.
† Lower coil.
△ Flexible leads.
§ Stiff leads.

RAILWAY MOTOR ARMATURE COILS

GE57 AND CO2007

Cat. No.	Turns	Voltage	Conductor	Coils Per Set	Illustration Fig. No
24948	1	250	(4) No. 9 B.&S.	37	4
24950	2	250	(3) No. 9 B.&S.	33	2
19221	2	500	(2) No. 9 B.&S.	37	2
50258	3	500	(2) No. 9 B.&S.	33	2
24953	4	500	No. 8 B.&S.	33	2
21490	6	500	No. 9 B.&S.	33	2

GE58 AND CO2004

24956	2	250	(3) No. 9 B.&S.	33	2
24958	3	250	(2) No. 9 B.&S.	33	2
50455	4	500	No. 8 B.&S.	33	2
50456	6	500	No. 9 B.&S.	33	2

GE59

24958	3	250	(2) No. 9 B.&S.	33	2
50455	4	500	No. 8 B.&S.	33	2
50456	6	500	No. 9 B.&S.	33	2

GE60

52399	2	250	(3) No. 11 B.&S.	37	2
52490	3	250	(2) No. 11 B.&S.	37	2
52397	4	500	No. 10 B.&S.	37	2
52398	6	500	No. 11 B.&S.	37	2

GE61

24960	4	250	No. 8 B.&S.	41	2
24962	4	500	No. 8 B.&S.	41	2

GE66

*24870 } †24871 }	1	500	.065" x .65"	39	6
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GE67

36848	3	500	No. 9 B.&S.	37	2
24964	4	500	No. 9 B.&S.	25	2

GE69

*33731 } †33732 }	1	500	.55" x .115"	31	6
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GE70

36848	3	500	No. 9 B.&S.	37	2
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* Upper coil.

† Lower coil.

RAILWAY MOTOR ARMATURE COILS

GE73

Cat. No.	Turns	Voltage	Conductor	Coils Per Set	Illustration Fig. No.
24967	2	500	(2) No. 8 B.&S.	39	2

GE74

33733	2	500	(2) No. 9 B.&S.	39	2
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GE77

52490	3	250	No. 11 B.&S.	37	2
52398	6	500	No. 11 B.&S.	37	2

GE78

43096	3	500	No. 12 B.W.G.	29	2
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GE79

60611	3	250	(2) No. 11 B.&S.	41	2
60612	6	500	No. 11 B.&S.	41	2

GE80

36848	3	500	No. 9 B.&S.	37	2
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GE81

11352	3	500	No. 10 B.&S.	29	2
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GE87

43097	2	500	(2) No. 10 B.&S.	43	2
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GE88

100789	3	500	No. 9 B.&S.	37	2
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GE90

43095	2	500	(2) No. 10 B.&S.	29	2
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GE95

61876	7	250	No. 13 B.W.G.	33	2
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GE96

60634	3	250	(2) .076" T.C.C.	37	2
60635	6	500	.076" T.C.C.	37	2

RAILWAY MOTOR ARMATURE COILS

GE97

Cat. No.	Turns	Voltage	Conductor	Coils Per Set	Illustration Fig. No.
60636	2	250	(4) No. 10 B.&S.	25	2
60637	2	500	(2) No. 10 B.&S.	29	2

GE202

59150	3	600	No. 9 B.&S.	25	2
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GE204

61074	2	600	(2) No. 10 B.&S. (Twinned)	29	2
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GE205

64299	2	600	(2) No. 8 B.&S.	25	2
49736	2	600-1200	(2) No. 10 B.&S.	37	2
64298	3	1200	No. 10 B.&S.	41	2
†100668	2	600	(3) No. 10 B.&S.	41	2

GE207

* 100790 } † 100791 }	1	600	.065" x .65"	29	6
* 100792 } † 100793 }	1	600/1200	.059" x .60"	29	6

GE210

59893	3	600	No. 7 B.&S.	25	2
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GE213

59150	3	600	No. 9 B.&S.	25	2
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GE216

61159	3	600	No. 9 B.&S.	25	2
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GE217

100794	3	600/1200	No. 11 B.W.G.	29	2
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GE218

100795	3	600	(2) No. 10 B.&S.	41	2
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GE219

61159	3	600	No. 9 B.&S.	25	2
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* Upper coil.

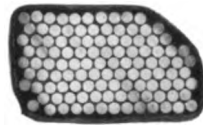
† Lower coil.

‡ For use with motors having spring flange for field coils.

RAILWAY MOTOR FIELD COILS



Fig. 1



Section of Impregnated Coil

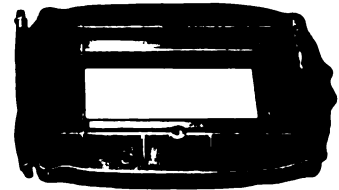


Fig. 2

In the manufacture of wire wound field coils for General Electric motors each turn is properly seated so as to avoid a burn-out as a result of abrasion of the insulation by vibration.

The insulation of all wire wound coils consists of a special asbestos and cotton covering; the insulation between turns of ribbon wound coils is asbestos paper, so laminated as to prevent any danger of short circuit between turns by reason of impurities in the asbestos.

All coils, unless otherwise noted in the tables, are further protected by being impregnated while in a vacuum, with an asphaltum compound which penetrates all the interstices of the winding, hermetically sealing the coil against the entrance of moisture and so improving its thermal conductivity that the heat generated is rapidly dissipated, thus considerably increasing the capacity of the coil.

NWP2 1/2

Cat. No.	Arm. Turns	Voltage	Conductor	Turns	Illustration Fig. No.
64851	14	250	No. 9 B.&S.	200	1
64852	26	500	No. 11 B.&S.	335	1

CB14

51972	10	250	No. 5 B.&S.	190	1
51974	17	500	No. 8 B.&S.	350	1

CB15

30769	16	250	No. 7 B.&S.	200	1
30770	30	500	No. 10 B.&S.	400	1

WP30

15448	Standard	500	No. 7 B.&S.	374	1
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WP50

15952	Standard	500	No. 4 B.&S.	202	1
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GE800 AND CO2005

27388	1	125	(2) No. 4 B.&S.	62	1
27388	2	250	(2) No. 4 B.&S.	62	1
*17142 } †17749 }	3 & 4	500	No. 6 B.&S.	203	1
*24913 } †24970 }	6	500	No. 7 B.&S.	259	1

* Upper coil.

† Lower coil.

RAILWAY MOTOR FIELD COILS

GE1000

Cat. No.	Arm. Turns	Voltage	Conductor	Turns	Illustration Fig. No.
14768	3 & 4	500	No. 4 B.&S.	143½	1

GE1200

24972	1	250	.050" x 1½"	68	1
18020	2 & 3	500	.045" x 1½"	138	1
18021	4	500	No. 5 B.&S.	198	1

GE51 AND CO2001

24916	1	250	1½" x .060"	36	2
24918	2	500	1½" x .080"	56	2

GE52 AND CO2002

†24920	2	250	No. 4 B.&S.	62½	1
†24922	3	250	No. 5 B.&S.	77½	1
†15761	4 & 5	500	No. 5 B.&S.	155½	1
68244	4 & 5	500	No. 5 B.&S.	155½	1
†21489	6	500	No. 6 B.&S.	185½	1

GE53

52567	2	250	1" x .0625"	58	2
52564	3 & 4	500	1" x .035"	120	2
52565	5	500	1" x .035"	140	1
52566	6	500	No. 4 B.&S.	250½	1

GE54

11348	3	500	No. 6 S.W.G.	128½	1
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GE55 AND CO2003

*24937 }	1	250	{ 1½" x .1875"	36	2
†24938 }			{ 1½" x .1875"	17	2
*50535 }			{ 1½" x 1"	62	2
†50536 }	1	500	{ 1½" x 1"	92	2
*24933 }			{ 1½" x .12"	54	2
†24934 }			{ 1½" x .12"	26	2
*24941 }	2	500	{ 1½" x .070"	86	2
†24942 }			{ 1½" x .070"	43	2
*24945 }			{ 1½" x .045"	126	2
†24946 }	3	500	{ 1½" x .045"	63	2

* Top and bottom coil.

† Side coil.

‡ Not impregnated on account of restricted space.

RAILWAY MOTOR FIELD COILS

GE57 AND CO2007

Cat. No.	Arm. Turns	Voltage	Conductor	Turns	Illustration Fig. No.
24949	1	250	1 $\frac{1}{8}$ " x .090"	44	2
24951	2	250	1 $\frac{1}{8}$ " x .080"	50 $\frac{1}{2}$	2
19222	2	500	1 $\frac{1}{8}$ " x .045"	90	2
§50240	2 and 3	500	1 $\frac{1}{8}$ " x .035"	110 $\frac{1}{2}$	2
24954	4	500	1 $\frac{1}{8}$ " x .030"	124	2
21492	6	500	No. 4 B.&S.	150	2

GE58 AND CO2004

†24957	2	250	(2) No. 3 B.&S.	58 $\frac{1}{2}$	1
†24959	3	250	(2) No. 4 B.&S.	75 $\frac{1}{2}$	1
†50420	4	500	No. 5 B.W.G.	144 $\frac{1}{2}$	1
60329	4	500	No. 5 B.W.G.	137 $\frac{1}{2}$	1
†19212	6	500	No. 6 S.W.G.	175 $\frac{1}{2}$	1

GE59

†24959	3	250	No. 4 B.&S.	75 $\frac{1}{2}$	1
†40578	4	500	No. 5 B.W.G.	137 $\frac{1}{2}$	1
†62463	6	500	.218" A.S.B.&S.C.C.	166 $\frac{1}{2}$	1

GE60

†52284	2	250	(2) No. 5 B.&S.	75 $\frac{1}{2}$	1
†52285	3	250	(2) No. 6 B.&S.	84 $\frac{1}{2}$	1
†52282	4	500	No. 5 B.&S.	149 $\frac{1}{2}$	1
†52283	6	500	No. 6 B.&S.	171 $\frac{1}{2}$	1

GE61

†24961	4	250	(2) No. 5 B.W.G.	58 $\frac{1}{2}$	1
†24963	4	500	No. 3 B.&S.	118 $\frac{1}{2}$	1

GE66

*24844 } †24845 }	1	500	{ 1 $\frac{1}{8}$ " x .120" 1" x .120"	56 29	2 2
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GE67

55857	3	500	No. 5 B.W.G.	110 $\frac{1}{2}$	1
24965	4	500	No. 5 B.W.G.	125 $\frac{1}{2}$	1

GE69

*33735 } †33736 }	1	500	{ 2" x .110" 2 $\frac{1}{2}$ " x .110"	35 35	2 2
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GE70

55857	3	500	No. 5 B.W.G.	110 $\frac{1}{2}$	1
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* Top and bottom coil.

† Side coil.

‡ Not impregnated on account of restricted space.

§ Cat. No. 50240 has in a few cases been used with 2 turn armature.

RAILWAY MOTOR FIELD COILS

GE73

Cat. No.	Arms. Turn	Voltage	Conductor	Turns	Illustration Fig. No.
*24968 } †24969 }	2	500	{ 1½" x .08" 1" x .08"	80 40	2 2

GE74

33734	2	500	1.53" x .053"	70½	1
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GE77

‡52285 ‡52283	3 6	250 500	No. 6 B.&S. No. 6 B.&S.	84½ 171½	1 1
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GE78

43099	3	500	No. 4 B.&S.	110½	1
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GE79

*60639 } †60638 } *60641 } †60440 }	3 6	250 500	{ No. 3 B.&S. No. 3 B.&S. No. 6 B.&S. No. 6 B.&S.	104 51 210 104	1 1 1 1
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GE80

55857	3	500	No. 5 B.W.G.	110½	1
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GE81

11348	3	500	No. 6 S.W.G.	128½	1
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GE87

43100	2	500	No. 4 B.&S.	87½	1
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GE88

100796	3	500	No. 5 B.W.G.	110½	1
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GE90

43098	2	500	No. 2 B.&S.	90½	1
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GE95

61878	7	250	No. 8 B.&S.	250	1
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* Top and bottom coil.

† Side coil.

‡ Not impregnated on account of restricted space.

RAILWAY MOTOR FIELD COILS

GE96

Cat. No.	Arm. Turns	Voltage	Conductor	Turns	Illustration Fig. No.
60642	3	250	No. 5 B.&S.	185	1
60643	6	500	No. 8 B.&S.	355	1

GE97

60644	2	250	No. 2 B.&S.	38½	1
60645	2	500	No. 5 B.&S.	80	1

GE202

△61071 } §59142 }	3	600	{ No. 5 B.W.G. No. 5 B.W.G.	70 58	1 1
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GE204

△61075 } §61076 }	2	600	{ No. 4 B.&S. 1.3" x .05"	46 40	1 1
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GE205

†64265 } *64264 } †64266 } π64267 }	2	600	{ 1" x .075" 1" x .075" 2" x .040" 2" x .040"	40 40 40 40	1 1 1 1
†100665 } *100664 } †100666 } π100667 }	s 2	600	{ 1" x .075" 1" x .075" 1" x .095" 1" x .095"	56 56 37.5 37.5	1 1 1 1
†49745 } *49744 } †49746 } π49747 }	2	600/1200	{ 1" x .060" 1" x .060" 2" x .025" 2" x .025"	52 52 58 58	1 1 1 1
†88957 } *88956 } †100831 } π100832 }	s 2	600/1200	{ 1" x .06" 1" x .06" 2" x .025" 2" x .025"	52 52 58 58	1 1 1 1
†64261 } *64260 } †64262 } π64263 }	3	1200	{ No. 5 B.&S. No. 5 B.&S. No. 5 B.&S. No. 5 B.&S.	100 100 89 89	1 1 1 1

GE207

†100798 } *100797 } †100799 }	1	600	{ .110" x 1½" .110" x 1½" .06" x 2."	40 40 30	1 1 1
π100800 } †100802 } *100801 } †100803 } π100804 }	1	600/1200	{ .06" x 2." 1.125" x .1" 1.125" x .1" 2" x .05" 2" x .05"	30 40 40 30 30	1 1 1 1 1

* Exciting coil side.

† Exciting coil top and bottom.

‡ Commutating coil (top axle and bottom suspension sides).

§ Coil, commutating.

△ Coil, exciting.

π Commutating coil (top suspension and bottom axle sides).

s For use with spring flange.

RAILWAY MOTOR FIELD COILS

GE210

Cat. No.	Arm. Turns	Voltage	Conductor	Turns	Illustration Fig. No.
Δ 59890 } \S 59891 } \ddagger 588958 }	3	600	{ No. 2 B.&S. 1.75" x .030" 1.75" x .030"	63 58 58	1 1 1

GE213

Δ 59141 } \S 59142 }	3	600	{ No. 5 B.W.G. No. 5 B.W.G.	60 58	1 1
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GE216

Δ 61162 } \S 61164 }	3	600	{ No. 5 B.W.G. No. 5 B.W.G.	70 62½	1 1
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GE217

Δ 100805 } \S 100806 }	3	600/1200	{ No. 5 B.W.G. No. 5 B.W.G.	75 67	1 1
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GE218

Δ 100807 } \S 100808 }	3	600	{ 1." x .055" .07" x .8"	66½ 52½	1 1
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GE219

Δ 61162 } \S 61164 }	3	600	{ No. 5 B.W.G. No. 5 B.W.G.	70 62½	1 1
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‡ For use with spring flange.

§ Coil, commutating.

Δ Coil, exciting.

RAILWAY MOTOR COMMUTATOR SEGMENTS

The General Electric Company's Commutator Segments are made of hard drawn copper bars and the finest homogeneous amber mica, from which all flint and other hard substances found in the natural mica have been removed.

Amber mica contains, in its natural state, large quantities of impurities, which, if not carefully removed, cause high spots in the segment insulation and a consequent sparking and deterioration in service. In the General Electric Company's product such impurities are thoroughly removed. This "cleaning" is accomplished by splitting to a maximum thickness of one and one-half mils, and then excluding all but perfectly clean, homogeneous mica.

The splittings thus obtained are pasted together to the required thickness and subjected, at high temperatures, to hydraulic pressure to exclude the surplus binder.

Experience has perfectly borne out our belief, reached some years ago, that the expense involved in splitting and pasting segment insulations is much more than justified by the longer life obtained, and, apart from the question of foreign substances, pasted insulations, being softer and more yielding than dry unsplit mica, wear down more evenly with the copper.

It is, however, essential to the maintenance of a tight commutator that softening from heat in operation should not result in any portion of the binder flowing out. *The special varnish used by the General Electric Company and the machinery and methods of pasting which have been developed, which, as far as we know, are not employed by any other manufacturer, are necessary to the production of segment insulations which will withstand the high temperatures and pressures to which all commutator parts are subjected in service.*

This method of preparing the segment insulations is the keynote to the whole question of assembled segment costs.



NWP2 1/2



GE1000

Cat. No.	Arm. Turns	Voltage	Remarks	Cat. No.	Arm. Turns	Voltage	Remarks
64850	14	250		16390	3 & 4	500	Form 2
64850	26	500		16391	3 & 4	500	Form 3
CB14				GE1200			
51997	10	250		55778	1	250	Form 7
51997	17	500		55790	2	500	Form 8
CB15				55775	3 & 4	500	Form 1
51997	16	250		55776	3 & 4	500	Form 2
51997	30	500		14501	3 & 4	500	Form 4
GE800 AND CO2005				55777	3 & 4	500	Form 5
27366	1	125		GE51 AND CO2001			
27367	2	250		14529	1	250	
16388	3, 4 & 6	500	Form 4	14528	2	500	
16389	3, 4 & 6	500	Form 6	GE52 AND CO2002			
52985	3, 4 & 6	500	Form 7	24923	2	250	
				55779	3	250	
				14530	4 & 5	500	
				14531	6	500	

RAILWAY MOTOR COMMUTATOR SEGMENTS

GE53

Cat. No.	Arm. Turns	Voltage
52990	2	250
52987	3	500
52988	4 & 5	500
52989	6	500

GE54

55780	3	500
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GE55 AND CO2003

24939	1	250
50581	1	500
24943	2	500
24947	3	500

GE57 AND CO2007

55782	1	250
24952	2	250
55783	2	500
50287	3	500
24955	4	500
24989	6	500

GE58 AND CO2004

55785	2	250
55784	3	250
50448	4	500
50449	6	500

GE59

61069	3	250
40579	4	500
62464	6	500

GE60

52390	2	250
52391	3	250
52388	4	500
52389	6	500

GE61

55786	4	250 & 500
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GE66

24876	1	500
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GE67

55788	3	500
24966	4	500

GE69

Cat. No.	Arm. Turns	Voltage
33738	1	500

GE70

33739	3	500
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GE73

24973	2	500
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GE74

33737	2	500
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GE77

36864	3	250
36865	6	500

GE78

43102	3	500
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GE79

60583	3	250
60584	6	500

GE80

33739	3	500
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GE81

55780	3	500
-------	---	-----

GE87

43104	2	500
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GE88

100784	3	500
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GE90

43101	2	500
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GE95

64849	7	250
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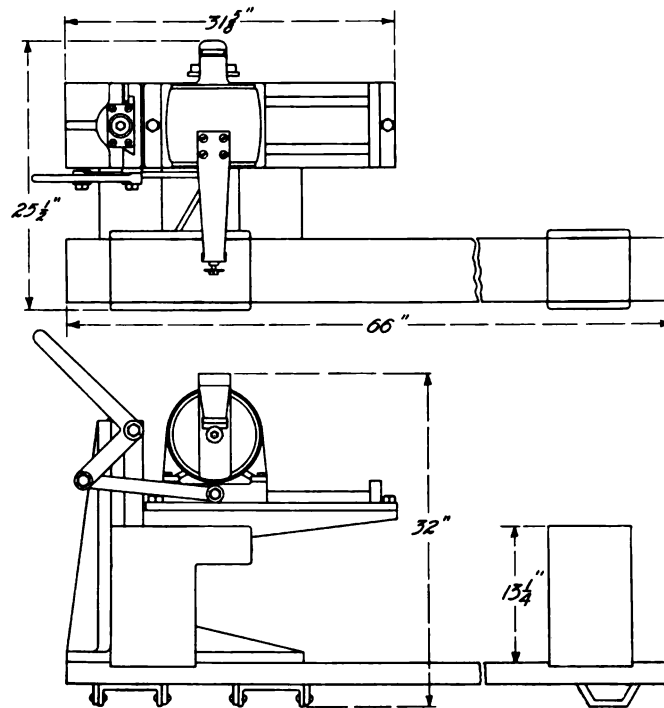
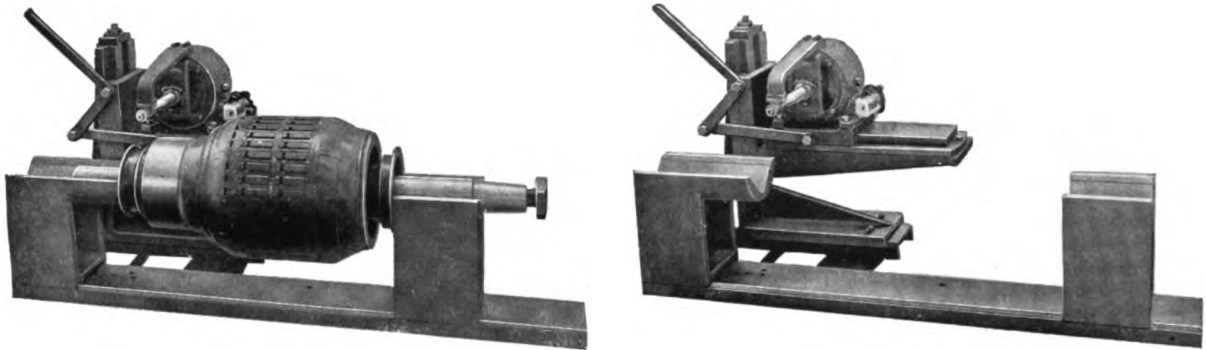
RAILWAY MOTOR COMMUTATOR SEGMENTS

GE96			GE210		
Cat. No.	Arm. Turns	Voltage	Cat. No.	Arm. Turns	Voltage
60585 60586	3 6	250 500	59895	3	600
GE97			GE213		
60587 60610	2 2	250 500	59152	3	600
GE202			GE216		
59152	3	600	61165	3	600
GE204			GE217		
61073	2	600	100787	3	600/1200
GE205			GE218		
*100669 †64315 49738 64314	2 2 2 3	600 600 600-1200 1200	100788	3	600
GE207			GE219		
100785 100786	1 1	600 600/1200	61165	3	600

* For use with 41 coil armature.

† For use with 25 coil armature.

COMMUTATOR GROOVING MACHINE FOR RAILWAY MOTORS



The Commutator Grooving Machine is designed to accommodate all the General Electric railway motor armatures built to date. It consists of a base with pillow blocks and "V" shaped bearings, one block with its bearings being adjustable horizontally; a carriage stand with rough horizontal adjustment at its base, vertical screw adjustment for the motor carriage slide arm, and an angular adjustment in the slide arm, to be used in case the bars are not exactly parallel to the shaft; also the grooving motor with its carriage and lever arms by which the carriage is operated on the slide arm.

The rotating saw is on the extended shaft of a CQ $\frac{1}{4}$ - $\frac{1}{2}$ h.p.-1200 r.p.m.-550 volt direct current motor. The extended shaft is long enough to permit using two saws, allowing the grooving of two slots at the same time.

Cat. No.	Description	Approximate Weight
100089	Commutator grooving machine for railway motors (50 spare saws are furnished with the machine)	750

RAILWAY MOTOR BEARING LININGS

In the design of railway motors for various classes of service, different types of bearing linings have been employed. In some cases the choice of type has been determined by the necessity for economy of space or other features of machine design; in others, operating conditions require a given type, but wherever possible the choice of one type or another is left to the customer as his operating conditions may indicate.

Thus where size of axle permits, axle linings for most motors are made both in Babbitt and bronze and every effort is made to meet the requirements of service under all conditions.

BRASS LININGS

Brass or bronze linings are made of compositions which have been thoroughly tested during many years of service. Much cheaper linings can be made by the employment of cheaper mixtures. In fact brass linings can be made for almost any price, but it is believed that the standard product which is identical with that used in original equipments, will involve a MINIMUM MAINTENANCE COST PER CAR MILE.



LUMEN LININGS

Lumen linings are made from a special patented alloy. It is a very excellent material for use under certain conditions, having in a certain degree the anti-friction qualities of Babbitt metal combined with sufficient strength to allow its use without a supporting shell where the housing allows room for sufficient thickness.

It is not furnished in any case for armature linings.

BABBITTED LININGS

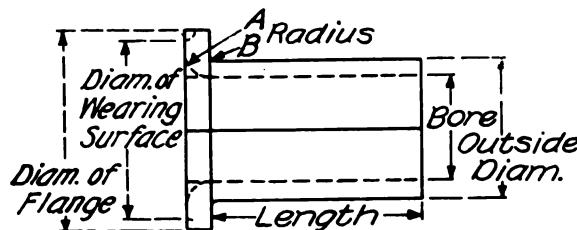
Babbitted linings are iron shells filled with General Electric Standard Railway Babbitt Metal.

BRASS AND BABBITT LININGS

Brass and Babbitt linings are bronze shells with a facing of Babbitt metal 1/16 in. thick sweated to the brass. The shells are provided with dovetail grooves with which the Babbitt engages, and which serve to anchor it securely. These linings are employed for armature bearings only, and the thickness of the Babbitt, being less than the air gap between core and pole face, the bearing may run hot enough to melt out the Babbitt without dropping the armature on the poles.

Axle linings with radius "A" are used with axles having larger diameter in gear fit than in motor axle bearings.

Axle linings with radius "B" are used with axle brackets which have angle rounded between bore and face.



Motor	Location	Cat. No.	DIMENSION IN INCHES					Metal	Type	
			Bore	Diam. of Flange	Outside Diam. Shell	Radius				Length
						A	B			
NWP-2½	Arm. C.E.	33617	1½	2½	1¾			1½	Gun Metal	Split
NWP-2½	Arm. P.E.	33618	2	2½	2½			3½	Gun Metal	Split
NWP-2½	Axle	33604	2¾	3¾	3½			4	Gun Metal	Split
CB-14-A, H&T	Arm. C.E.	51946	1½	2⅞	2⅞	¾		2½	Brass	Split
CB-14-A, H&T	Arm. P.E.	51947	2	2½	2½	¾		4⅞	Brass	Split
CB-14-A&H	Axle C.E.	51942	2¾	3¾	3½	¾		4½	Brass	Split
CB-14-A&H	Axle P.E.	51943	2¾	3¾	3½	¾		4½	Brass	Split

RAILWAY MOTOR BEARING LININGS

Motor	Location	Cat. No.	DIMENSIONS IN INCHES						Metal	Type
			Bore	Diam. of Flange	Outside Diam. Shell	Radius		Length		
						A	B			
CB14-A&H	Axle C.E.	51944	3	4	3 $\frac{3}{8}$			4 $\frac{1}{4}$	Brass	Split
CB14-A&H	Axle P.E.	51945	3	4	3 $\frac{3}{8}$			4 $\frac{1}{4}$	Brass	Split
CB14-T	Axle C.E.	59437	3	4 $\frac{1}{2}$	3 $\frac{5}{8}$			5 $\frac{1}{2}$	Brass	Split
CB14-T	Axle P.E.	59438	3	4 $\frac{1}{2}$	3 $\frac{5}{8}$			5 $\frac{1}{2}$	Brass	Split
CB15-G	Arm. C.E.	30760	1 $\frac{1}{2}$	2 $\frac{3}{16}$	1 $\frac{1}{8}$	$\frac{3}{32}$		2 $\frac{1}{8}$	Brass	Split
CB15-G	Arm. P.E.	30761	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{3}{32}$		3 $\frac{1}{8}$	Brass	Split
CB15-G	Axle C.E.	51942	2 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{1}{8}$	$\frac{3}{32}$		4 $\frac{1}{4}$	Brass	Split
CB15-G	Axle P.E.	51943	2 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{1}{8}$	$\frac{3}{32}$		4 $\frac{1}{4}$	Brass	Split
GE800-B & CO2005	Arm. C.E.	17096	2 $\frac{1}{2}$	4	3 $\frac{1}{2}$			4 $\frac{1}{4}$	C.I. & Bab.	Solid
GE800-B & CO2005	Arm. P.E.	17095	2 $\frac{1}{2}$	4	3 $\frac{1}{2}$			5 $\frac{3}{8}$	C.I. & Bab.	Split
GE800-B & CO2005	Arm. C.E.	17559	2 $\frac{1}{2}$	4	3 $\frac{1}{2}$			4 $\frac{1}{4}$	Brass	Solid
GE800-B & CO2005	Arm. P.E.	17558	2 $\frac{1}{2}$	4	3 $\frac{1}{2}$			5 $\frac{3}{8}$	Brass	Split
GE800-B & CO2005	Axle	17556	3 $\frac{3}{8}$	5	4 $\frac{3}{8}$	$\frac{3}{32}$		6 $\frac{1}{8}$	Brass	Split
GE800-B & CO2005	Axle	17240	3 $\frac{3}{8}$	5	4 $\frac{3}{8}$	$\frac{1}{8}$		6 $\frac{1}{8}$	C.I. & Bab.	Split
GE800-B & CO2005	Axle	17229	3 $\frac{3}{4}$	5	4 $\frac{3}{8}$			6 $\frac{1}{8}$	Brass	Split
GE800-B & CO2005	Axle	33751	4	5 $\frac{3}{8}$	4 $\frac{7}{8}$			6 $\frac{1}{8}$	Brass	Split
*GE1000-A	Arm. C.E.	14729	2 $\frac{5}{8}$	5	3 $\frac{7}{8}$			5 $\frac{3}{8}$	C.I. & Bab.	Solid
GE1000-A	Arm. P.E.	14728	3	5 $\frac{3}{8}$	4 $\frac{1}{2}$			7 $\frac{1}{4}$	C.I. & Bab.	Split
*GE1000-A	Arm. C.E.	14730	2 $\frac{5}{8}$	5	3 $\frac{7}{8}$			5 $\frac{3}{8}$	Brass	Solid
GE1000-A	Arm. P.E.	14727	3	5 $\frac{3}{8}$	4 $\frac{1}{2}$			7 $\frac{1}{4}$	Brass	Split
GE1000-A	Axle	14722	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE1000-A	Axle	14748	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE1000-A	Axle	14721	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE1000-A	Axle	14723	4	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE1000-A	Axle	14725	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE1000-A	Axle	14724	3 $\frac{3}{4}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE1000-A	Axle	14726	4	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE1000-A	Axle	33605	4 $\frac{1}{4}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE1000-A	Axle	33425	4 $\frac{1}{2}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE1200-B	Arm. C.E.	18010	2 $\frac{3}{4}$	4 $\frac{3}{4}$	3 $\frac{3}{4}$			4 $\frac{3}{4}$	C.I. & Bab.	Solid
GE1200-B	Arm. P.E.	18009	2 $\frac{3}{4}$	4 $\frac{3}{4}$	3 $\frac{3}{4}$			6 $\frac{1}{8}$	C.I. & Bab.	Split
GE1200-B	Axle	18012	4	6	5			7 $\frac{1}{8}$	Brass	Split
GE51-B & CO2001	Arm. C.E.	33410	3	6	4 $\frac{1}{2}$			5 $\frac{1}{8}$	C.I. & Bab.	Solid
GE51-B & CO2001	Arm. P.E.	33411	3 $\frac{1}{4}$	6 $\frac{1}{4}$	5			6 $\frac{1}{2}$	C.I. & Bab.	Solid
GE51-B & CO2001	Axle	33424	5	8	5 $\frac{1}{2}$			10 $\frac{1}{2}$	Brass	Split
GE52-A & CO2002	Arm. C.E.	14581	2 $\frac{1}{2}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$			5 $\frac{1}{8}$	C.I. & Bab.	Solid
GE52-A & CO2002	Arm. P.E.	14582	2 $\frac{3}{4}$	4 $\frac{3}{4}$	4			7	C.I. & Bab.	Split
GE52-A & CO2002	Axle	14722	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE52-A & CO2002	Axle	14748	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE52-A & CO2002	Axle	14721	3 $\frac{3}{4}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE52-A & CO2002	Axle	14723	4	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE52-A & CO2002	Axle	14725	3 $\frac{3}{8}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE52-A & CO2002	Axle	14724	3 $\frac{3}{4}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE52-A & CO2002	Axle	14726	4	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split
GE52-A & CO2002	Axle	33605	4 $\frac{1}{4}$	6	5 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass	Split

* Includes cast-iron screw cap.

RAILWAY MOTOR BEARING LININGS

Motor	Location	Cat. No.	DIMENSIONS IN INCHES						Length	Metal	Type
			Bore	Diam. of Flange	Outside Diam. Shell	Radius					
						A	B				
GE52-A & CO2002	Axle	33425	4½	6	5½			7½	Brass	Split	
GE53-A	Arm. C.E.	52529	2½	4½	3½			4½	Brass & Bab.	Solid	
GE53-A	Arm. P.E.	52530	3	5½	3½			7½	Brass & Bab.	Solid	
GE53-A	Axle	52526	3½	6	4½			6½	Brass	Split	
GE53-A	Axle	52527	3½	6	4½			6½	Brass	Split	
GE53-A	Axle	52528	4	6	4½			6½	Brass	Split	
GE53-A	Axle	33606	4½	6	4½			6½	Brass	Split	
GE54-A	Arm. C.E.	14581	2½	4½	3½			5½	C.I. & Bab.	Solid	
GE54-A	Arm. P.E.	14582	2½	4½	4			7	C.I. & Bab.	Split	
GE54-A	Axle	14722	3½	6	5½			7½	Mall. I. & Bab.	Split	
GE54-A	Axle	14748	3½	6	5½			7½	Mall. I. & Bab.	Split	
GE54-A	Axle	14721	3½	6	5½			7½	Mall. I. & Bab.	Split	
GE54-A	Axle	14723	4	6	5½			7½	Mall. I. & Bab.	Split	
GE54-A	Axle	14725	3½	6	5½			7½	Brass	Split	
GE54-A	Axle	14724	3½	6	5½			7½	Brass	Split	
GE54-A	Axle	14726	4	6	5½			7½	Brass	Split	
GE54-A	Axle	33605	4½	6	5½			7½	Brass	Split	
GE54-A	Axle	33425	4½	6	5½			7½	Brass	Split	
GE55-A & H & CO2003	Arm. C.E.	50510	3½	5½	4			7½	Brass & Bab.	Solid	
GE55-A & H & CO2003	Arm. P.E.	50511	3½	6½	4½			10½	Brass & Bab.	Solid	
GE55-A & CO2003	Axle	50507	4½	8	6	½		9½	Brass	Split	
GE55-A & CO2003	Axle	50508	5	8	6	½		9½	Brass	Split	
GE55-A & CO2003	Axle	50509	5½	8	6	½		9½	Brass	Split	
GE55-H & CO2003	Axle	33426	6	10½	7½	½		9½	Brass	Split	
GE57-A & H & CO2007	Arm. C.E.	50223	2½	5½	4½			5½	C.I. & Bab.	Solid	
GE57-A & H & CO2007	Arm. P.E.	50224	3½	5½	4½			7	C.I. & Bab.	Solid	
GE57-A & CO2007	Axle	50222	3½	6½	5½			8½	Brass	Split	
GE57-A & CO2007	Axle	50221	4	6½	5½			8½	Brass	Split	
GE57-A & CO2007	Axle	50220	4½	6½	5½			8½	Brass	Split	
GE57-A & CO2007	Axle	50219	4½	6½	5½	½		8½	Brass	Split	
GE57-H & CO2007	Axle	33427	5	7½	6			8½	Brass	Split	
GE57-H & CO2007	Axle	33428	5½	8	6	½		8½	Brass	Split	
GE58-A & CO2004	Arm. C.E.	50414	2½	5½	4½			4½	C.I. & Bab.	Solid	
GE58-A & CO2004	Arm. P.E.	50415	3	5½	4½			5½	C.I. & Bab.	Solid	
GE58-A & CO2004	Arm. C.E.	50416	2½	5½	4½			4½	Brass	Solid	
GE58-A & CO2004	Arm. P.E.	50417	3	5½	4½			5½	Brass	Solid	
GE58-A & CO2004	Axle	14722	3½	6	5½			7½	Mall. I. & Bab.	Split	
GE58-A & CO2004	Axle	14721	3½	6	5½			7½	Mall. I. & Bab.	Split	
GE58-A & CO2004	Axle	14723	4	6	5½			7½	Mall. I. & Bab.	Split	
GE58-A & CO2004	Axle	14725	3½	6	5½			7½	Brass	Split	
GE58-A & CO2004	Axle	14724	3½	6	5½			7½	Brass	Split	
GE58-A & CO2004	Axle	14726	4	6	5½			7½	Brass	Split	

RAILWAY MOTOR BEARING LININGS

Motor	Location	Cat. No.	Bore	Diam. of Flange	Outside Diam. Shell	Radius		Length	Metal	Type
						A	B			
GE58-A & CO2004	Axle	33605	4 1/2	6	5 1/2			7 1/2	Brass	Split
GE59-A	Arm. C.E.	60524	2 3/8	5 1/8	4 3/8			3 1/2	C.I. & Bab.	Solid
GE59-A	Arm. P.E.	60525	3	5 1/2	4 1/2			4 3/8	C.I. & Bab.	Solid
GE59-A	Axle	33429	4	6	5 1/2			6 3/8	C.I. & Bab.	Split
GE59-A	Axle	100052	4 1/4	7	5 1/4	1/8		6 3/8	Brass	Split
GE60-A	Arm. C.E.	52268	2 1/2	4 1/2	4			3 1/2	C.I. & Bab.	Solid
GE60-A	Arm. P.E.	52269	2 1/2	5	4 3/8			4 1/8	C.I. & Bab.	Solid
GE60-A	Axle	14722	3 3/8	6	5 1/4			7 1/4	Mall. I. & Bab.	Split
GE60-A	Axle	14748	3 3/8	6	5 1/4			7 1/4	Mall. I. & Bab.	Split
GE60-A	Axle	14721	3 1/2	6	5 1/4			7 1/4	Mall. I. & Bab.	Split
GE60-A	Axle	14723	4	6	5 1/4			7 1/4	Mall. I. & Bab.	Split
GE60-A	Axle	14725	3 3/8	6	5 1/4			7 1/4	Brass	Split
GE60-A	Axle	14724	3 1/2	6	5 1/4			7 1/4	Brass	Split
GE60-A	Axle	14726	4	6	5 1/4			7 1/4	Brass	Split
GE61-A&B	Arm. C.E.	33412	2 1/2	4 1/2	3 3/4			4 1/2	Brass & Bab.	Solid
GE61-A&B	Arm. P.E.	33413	3	5 1/2	3 3/4			6 1/8	Brass & Bab.	Solid
GE61-A&B	Axle	52528	4	6	4 7/8			6 1/2	Brass	Split
GE61-A&B	Axle	33606	4 1/2	6	4 7/8			6 1/2	Brass	Split
GE66-A&B	Arm. C.E.	24575	3 3/4	6 1/2	4 1/2			5 1/8	Brass & Bab.	Solid
GE66-A&B	Arm. P.E.	24576	4	8 1/4	4 7/8			9 1/2	Brass & Bab.	Solid
GE66-A	Axle	24568	5	8 1/2	6	1/8		9 1/2	Brass	Split
GE66-A	Axle	24570	5 1/2	8 1/2	6	1/8		9 1/2	Brass	Split
GE66-A	Axle	33609	5 1/2	8 1/2	6		1/4	9 1/2	Brass	Split
GE66-A	Axle	24567	5	8 1/2	6	1/8		9 1/2	Lumen	Split
GE66-A	Axle	24569	5 1/2	8 1/2	6	1/8		9 1/2	Lumen	Split
GE66-B	Axle	33164	5 1/2	9 1/2	7 1/4	1/8		9 1/2	Brass	Split
GE66-B	Axle	24572	6	9 1/2	7 1/4	1/8		9 1/2	Brass	Split
GE66-B	Axle	33610	6	9 1/2	7 1/4	1/8		9 1/2	Brass	Split
GE66-B	Axle	33465	6 1/2	9 1/2	7 1/4	1/8		9 1/2	Brass	Split
GE66-B	Axle	24574	6 1/2	9 1/2	7 1/4	1/8		9 1/2	Brass	Split
GE66-B	Axle	24571	6	9 1/2	7 1/4	1/8		9 1/2	Lumen	Split
GE66-B	Axle	24573	6 1/2	9 1/2	7 1/4	1/8		9 1/2	Lumen	Split
GE66-C	Axle	100062	5 1/2	9 1/2	7 1/4	1/8	1/4	9 1/2	Mall. I. & Bab.	Split
GE66-C	Axle	43335	6	9 1/2	7 1/4	1/8	1/4	9 1/2	Brass	Split
GE66-H	Axle	46220	6 1/2	9 1/2	7 1/4	1/8	1/4	9 1/2	Lumen	Split
GE67-A	Arm. C.E.	55843	2 3/4	4	3 3/4			5 1/8	C.I. & Bab.	Solid
GE67-A	Arm. P.E.	55844	3	5 1/2	4 1/2			6 1/2	C.I. & Bab.	Solid
GE67-A	Axle	55841	3 3/8	**6 1/2	5 1/2			7 1/2	Mall. I. & Bab.	Split
GE67-A	Axle	55840	3 3/8	**6 1/2	5 1/2			7 1/2	Mall. I. & Bab.	Split
GE67-A	Axle	55839	4	**6 1/2	5 1/2			7 1/2	Mall. I. & Bab.	Split
GE67-A	Axle	55838	4 1/4	**6 1/2	5 1/2			7 1/2	Mall. I. & Bab.	Split
GE67-A	Axle	55842	4 1/4	**6 1/2	5 1/2			7 1/2	Brass	Split
GE69-B	Arm. C.E.	33418	3 1/2	6 1/2	4 1/2			6 1/2	Brass & Bab.	Solid
GE69-B	Arm. P.E.	33419	4 1/4	6 1/2	5 1/2			9 1/8	Brass & Bab.	Solid
*GE69-B	Axle	27927	6 1/2	10 1/2	7 1/2	1/8	1/4	10 1/2	Brass	Split
†GE69-B	Axle	33434	6 1/2	10 1/2	7 1/2	1/8	1/4	10 1/2	Brass	Split
GE69-C	Axle	43336	7	11	8 1/2	1/8	1/4	10 1/2	Brass & Bab.	Split
GE70-A&D	Arm. C.E.	33420	2 1/2	5	3 3/4			6 1/2	Brass & Bab.	Solid
GE70-A&D	Arm. P.E.	33421	3 1/4	5 1/2	4 1/2			7 1/2	Brass & Bab.	Solid
GE70-A&D	Axle	33435	4	8	5 1/2	1/8	1/4	8 3/4	Lumen	Split
GE70-A&D	Axle	46632	4 1/4	8	5 1/2	1/8	1/4	8 3/4	Lumen	Split
GE70-A&D	Axle	33436	4 1/2	8	5 1/2	1/8	1/4	8 3/4	Lumen	Split
GE70-A&D	Axle	33437	5	8	5 1/2	1/8	1/4	8 3/4	Lumen	Split
GE70-A&D	Axle	47853	5	8	5 1/2	1/8	1/4	8 3/4	Brass	Split
GE73-C&E	Arm. C.E.	32359	3 1/2	5 1/2	3 7/8			7 1/2	Brass & Bab.	Solid
GE73-C&E	Arm. P.E.	32360	3 1/2	6	4 1/2			9 1/2	Brass & Bab.	Solid
GE73-C	Axle	32354	5	8 1/4	6 1/2	1/8		9 1/2	Brass	Split
GE73-C	Axle	32355	5 1/2	8 1/4	6 1/2	1/8		9 1/2	Brass	Split
GE73-C	Axle	32356	5 1/2	8 1/4	6 1/2	1/8		9 1/2	Brass	Split
GE73-E	Axle	47854	4 1/2	8 1/2	6			9 1/2	Brass	Split
GE73-E	Axle	32357	5	8 1/2	6	1/8		9 1/2	Brass	Split
GE73-E	Axle	32358	5 1/2	8 1/2	6	1/8		9 1/2	Brass	Split
GE74-A	Arm. C.E.	33422	3 3/8	5 1/2	3 7/8			6 1/2	Brass & Bab.	Solid
GE74-A	Arm. P.E.	33423	3 3/8	5 1/2	4 1/2			8 1/2	Brass & Bab.	Solid
GE74-A	Axle	†37571	4 1/2	8 1/2	6 1/2	1/8		9 1/2	Lumen	Split

* Thickness of flange $\frac{3}{4}$ in. † Thickness of flange $\frac{5}{8}$ in. ** Diam. of wearing surface on flange 6 in.

RAILWAY MOTOR BEARING LININGS

Motor	Location	Cat. No.	DIMENSIONS IN INCHES						Length	Metal	Type
			Bore	Diam. of Flange	Outside Diam. Shell	Radius					
						A	B				
GE74-A	Axle	*37572	4 1/4	8 1/2	6 1/4	1/8	1/4	9 1/2	Lumen	Split	
GE74-A	Axle	†37573	4 1/4	8 1/2	6 1/4	1/8		9 1/2	Lumen	Split	
GE74-A	Axle	*37574	4 1/2	8 1/2	6 1/4	1/8	1/4	9 1/2	Lumen	Split	
GE74-A	Axle	†37575	5	8 1/2	6 1/4	1/8		9 1/2	Lumen	Split	
GE74-A	Axle	*37576	5	8 1/2	6 1/4	1/8	1/4	9 1/2	Lumen	Split	
GE74-A	Axle	†33438	5 1/4	8 1/2	6 1/4	1/8		9 1/2	Lumen	Split	
GE74-A	Axle	*37577	5 1/4	8 1/2	6 1/4	1/8	1/4	9 1/2	Lumen	Split	
GE74-A	Axle	†33439	5 1/4	8 1/2	6 1/4	1/8		9 1/2	Lumen	Split	
GE74-A	Axle	*37578	5 1/2	8 1/2	6 1/4	1/8	1/4	9 1/2	Lumen	Split	
GE77-A	Arm. C.E.	38692	2 1/2	4 1/2	4			3 1/2	C.I. & Bab.	Solid	
GE77-A	Arm. P.E.	38693	3	5 1/2	4 5/8			3 1/2	C.I. & Bab.	Solid	
GE77-A	Axle	38648	3 3/4	6	5 1/4			6 1/2	C.I. & Bab.	Split	
GE77-A	Axle	38650	4	6	5 1/4			6 1/2	C.I. & Bab.	Split	
GE78-A	Arm. C.E.	41062	2 3/4	2 3/4	3 3/4			5 1/2	Brass & Bab.	Solid	
GE78-A	Arm. P.E.	41063	2 3/4	5 1/2	4 1/2			7 1/2	Brass & Bab.	Split	
GE78-A	Arm. C.E.	43091	2 3/4	4 1/2	3 3/4		1/8	5 1/2	Mall. I. & Bab.	Solid	
GE78-A	Arm. P.E.	43092	3 1/2	5 1/2	4 1/2		1/8	7 1/2	Mall. I. & Bab.	Split	
GE78-A	Axle	42991	3 1/2	6 1/2	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE78-A	Axle	42992	4	6 1/2	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE78-A	Axle	42993	4 1/4	6 1/2	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE78-A	Axle	41055	4 1/2	6 1/2	5 1/2	1/8	1/4	8 1/2	Brass	Split	
GE78-A	Axle	41056	4 1/2	6 1/2	5 1/2	1/8	1/4	8 1/2	Brass	Split	
GE79-A	Arm. C.E.	41064	2 1/2	4 1/2	3 1/4			4 1/2	Brass	Solid	
GE79-A	Arm. P.E.	41065	3	5 1/2	3 3/4			6 1/2	Brass	Solid	
GE79-A	Axle	41057	4	6	4 3/4	1/8	1/8	6 1/2	Brass	Split	
GE80-A,B,C	Arm. C.E.	38694	2 3/4	5	3 1/4			6 1/2	Brass & Bab.	Solid	
GE80-A,B,C	Arm. P.E.	38695	3 1/2	5 1/2	4 1/4			7 1/2	Brass & Bab.	Split	
GE80-A	Axle	38649	3 1/2	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE80-A	Axle	38696	4	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE80-A	Axle	38697	4 1/4	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE80-A	Axle	38698	4 1/2	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE80-A	Axle	38699	5	8	5 1/2	1/8	1/4	8 1/2	Brass	Split	
GE80-B	Axle	41058	4	8	6 1/2	1/8		8 1/2	Mall. I. & Bab.	Split	
GE80-C	Axle	45495	4	8	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE80-C	Axle	46144	4 1/2	8	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE80-C	Axle	38554	5	8	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE81-A	Arm. C.E.	41066	2 1/2	4 1/2	3 1/2			5 1/2	Brass & Bab.	Solid	
GE81-A	Arm. P.E.	41067	2 3/4	4 3/4	3 5/8			7 1/2	Brass & Bab.	Split	
GE81-A	Axle	46587	3 1/2	**6 1/2	5 1/2	1/8	1/8	7 1/2	Mall. I. & Bab.	Split	
GE81-A	Axle	41059	4	**6 1/2	5 1/2	1/8	1/8	7 1/2	Mall. I. & Bab.	Split	
GE81-A	Axle	46588	4 1/2	**6 1/2	5 1/2	1/8	1/8	7 1/2	Brass	Split	
GE87-A&B	Arm. C.E.	43093	3 1/2	5 1/2	4 1/2			6 1/2	Brass & Bab.	Solid	
GE87-A&B	Arm. P.E.	43094	3 1/2	6	4 1/2			7 1/2	Brass & Bab.	Split	
GE87-A	Axle	42996	4	8	6 1/4	1/8	1/4	10	Mall. I. & Bab.	Split	
GE87-A	Axle	42997	4 1/4	8	6 1/4	1/8	1/4	10	Mall. I. & Bab.	Split	
GE87-A	Axle	42998	4 1/2	8	6 1/4	1/8	1/4	10	Mall. I. & Bab.	Split	
GE87-A	Axle	42999	5	8	6 1/4	1/8	1/4	10	Mall. I. & Bab.	Split	
GE87-A	Axle	45421	5	8	6 1/4	1/8	1/4	10	Brass	Split	
GE87-A	Axle	45420	5 1/2	8	6 1/4	1/8	1/4	10	Brass	Split	
GE87-A	Axle	45412	5 1/2	8	6 1/4	1/8	1/4	10	Brass	Split	
GE87-B	Axle	47855	5	8	6 1/4	1/8	1/4	10	Brass	Split	
GE87-B	Axle	43090	5 1/2	8	6 1/4	1/8	1/4	10	Brass	Split	
GE88-A&C	Arm. C.E.	100068	2 1/2	5 1/2	4 1/4			6 1/2	Mall. I. & Bab.	Solid	
GE88-ABC&D	Arm. P.E.	100069	3 1/2	5 1/2	4 1/2			7 1/2	Mall. I. & Bab.	Solid	
GE88-B&D	Arm. C.E.	100070	2 1/2	5 1/2	4 1/4			6 1/2	Mall. I. & Bab.	Solid	
GE88-ABC&D	Axle	100916	4	9	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE88-ABC&D	Axle	100053	4 1/2	9	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE88-ABC&D	Axle	100057	5	9	6 1/2			8 1/2	Mall. I. & Bab.	Split	
GE90-A	Arm. C.E.	38694	2 1/2	5	3 3/4			6 1/2	Brass & Bab.	Solid	
GE90-A	Arm. P.E.	38695	3 1/2	5 1/2	4 1/4			7 1/2	Brass & Bab.	Split	
GE90-A	Axle	38649	3 1/2	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE90-A	Axle	38696	4	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE90-A	Axle	38697	4 1/2	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE90-A	Axle	38698	4 1/2	8	5 1/2	1/8	1/4	8 1/2	Mall. I. & Bab.	Split	
GE90-A	Axle	38699	5	8	5 1/2	1/8	1/4	8 1/2	Brass	Split	

* For use with GE-74-A motors having ends of axle brackets counterbored 1/8 in. radius. † For use with GE-74-A motors having axle brackets without ends being counterbored. ** Diam. of wearing surface on flange 6 in.

RAILWAY MOTOR BEARING LININGS

Motor	Location	Cat. No.	Bore	Diam. of Flange	Outside Diam. Shell	Radius		Length	Metal	Type
						A	B			
GE90-B	Axle	45271	5	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE95-A	Arm. C.E.	64854	1 $\frac{1}{2}$	2 $\frac{3}{4}$	1 $\frac{1}{8}$			2 $\frac{1}{4}$	Brass	Solid
GE95-A	Arm. P.E.	64856	2	3	2 $\frac{1}{4}$			3 $\frac{3}{4}$	Brass	Solid
GE95-A	Axle	64853	2 $\frac{3}{4}$	4 $\frac{1}{4}$	3 $\frac{1}{2}$			4 $\frac{1}{8}$	Brass	Split
GE96-B	Arm. C.E.	66083	2	4 $\frac{1}{4}$	3			2 $\frac{1}{8}$	Mall. I. & Bab.	Solid
GE96-B	Arm. P.E.	66084	2 $\frac{1}{2}$	5 $\frac{1}{4}$	3 $\frac{3}{8}$			3 $\frac{1}{4}$	Mall. I. & Bab.	Solid
GE96-B	Axle	60522	3 $\frac{1}{2}$	5 $\frac{1}{4}$	4			5 $\frac{1}{2}$	Brass	Split
GE97-B	Arm. C.E.	60528	3 $\frac{1}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{2}$			4 $\frac{3}{4}$	Mall. I. & Bab.	Solid
GE97-B	Arm. P.E.	60529	3 $\frac{1}{2}$	5 $\frac{1}{4}$	4 $\frac{1}{2}$			4 $\frac{3}{4}$	Mall. I. & Bab.	Solid
GE97-B	Axle	60523	5	8	5 $\frac{3}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Brass	Split
GE202-A	Arm. C.E.	61901	2 $\frac{3}{4}$	5	3 $\frac{3}{4}$			6 $\frac{1}{4}$	Brass & Bab.	Solid
GE202-A	Arm. P.E.	61902	3 $\frac{1}{4}$	5 $\frac{3}{4}$	4 $\frac{1}{4}$			7 $\frac{1}{4}$	Brass & Bab.	Split
GE202-A	Axle	41058	4	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE202-A	Axle	59425	4 $\frac{1}{4}$	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE202-A	Axle	45270	4 $\frac{1}{2}$	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE202-A	Axle	47856	5	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{8}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE204-A	Arm. C.E.	59820	3 $\frac{3}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{2}$			5 $\frac{1}{4}$	Brass & Bab.	Solid
GE204-A	Arm. P.E.	59821	3 $\frac{3}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{2}$			7 $\frac{1}{4}$	Brass & Bab.	Split
GE204-A	Axle	62562	5	9	7	$\frac{1}{2}$	$\frac{3}{8}$	9 $\frac{1}{8}$	Mall. I. & Bab.	Split
GE204-A	Axle	62352	5 $\frac{1}{2}$	9	7	$\frac{1}{2}$	$\frac{3}{8}$	9 $\frac{1}{8}$	Mall. I. & Bab.	Split
GE204-A	Axle	59814	6	9	7	$\frac{1}{2}$	$\frac{3}{8}$	9 $\frac{1}{8}$	Brass	Split
GE205-A&B	Arm. C.E.	49739	3 $\frac{1}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{8}$		$\frac{1}{16}$	6 $\frac{1}{4}$	Brass & Bab.	Solid
GE205-A&B	Arm. P.E.	49740	3 $\frac{1}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{2}$		$\frac{1}{16}$	9 $\frac{1}{4}$	Brass & Bab.	Solid
GE205-A&B	Axle	47857	5	*9 $\frac{1}{2}$	7	$\frac{1}{2}$	$\frac{1}{16}$	9 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE205-A&B	Axle	100063	5 $\frac{1}{2}$	*9 $\frac{1}{2}$	7	$\frac{1}{2}$	$\frac{1}{16}$	9 $\frac{1}{4}$	Mall. I. & Bab.	Split
GE205-A&B	Axle	100662	5 $\frac{1}{2}$	9	7	$\frac{1}{2}$	$\frac{1}{16}$	9 $\frac{1}{4}$	Brass	Split
GE205-A&B	Axle	47858	6	*9 $\frac{1}{2}$	7	$\frac{1}{2}$	$\frac{1}{16}$	9 $\frac{1}{4}$	Brass	Split
GE205-A&B	Axle	102708	6	9 $\frac{1}{2}$	7	$\frac{1}{2}$	$\frac{1}{16}$	9 $\frac{1}{4}$	Brass	Split
GE207-A	Arm. C.E.	41060	3 $\frac{3}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{2}$			6 $\frac{1}{4}$	Brass & Bab.	Solid
GE207-A	Arm. P.E.	59822	4 $\frac{1}{4}$	6 $\frac{3}{4}$	5 $\frac{1}{8}$			9 $\frac{1}{4}$	Brass & Bab.	Solid
GE207-A	Axle	100066	6	10 $\frac{1}{2}$	7 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{16}$	10 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE207-A	Axle	100067	6 $\frac{1}{2}$	10 $\frac{1}{2}$	7 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{16}$	10 $\frac{3}{4}$	Brass & Bab.	Split
GE210-A,B&C	Arm. C.E.	59823	3 $\frac{3}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	6 $\frac{1}{4}$	Brass & Bab.	Solid
GE210-A,B&C	Arm. P.E.	59824	3 $\frac{3}{4}$	6 $\frac{1}{4}$	4 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{1}{4}$	Brass & Bab.	Solid
GE210-A&B	Axle	59816	4 $\frac{1}{2}$	8	5 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{1}{4}$	Brass	Split
GE210-C	Axle	100054	4 $\frac{1}{2}$	10	6 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE210-C	Axle	100056	4 $\frac{1}{2}$	10	6 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE210-C	Axle	100058	5	10	6 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE210-C	Axle	100064	5 $\frac{1}{2}$	10	6 $\frac{1}{2}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Brass	Split
GE213-A	Arm. C.E.	59126	2 $\frac{3}{4}$	5 $\frac{1}{4}$	3 $\frac{3}{4}$			7 $\frac{1}{4}$	Brass & Bab.	Solid
GE213-A	Arm. P.E.	59127	3 $\frac{1}{4}$	5 $\frac{3}{4}$	4 $\frac{1}{8}$			7 $\frac{7}{8}$	Brass & Bab.	Solid
GE213-A	Axle	59125	5	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Brass	Split
GE216-A&C	Arm. C.E.	61325	2 $\frac{3}{4}$	5 $\frac{1}{4}$	3 $\frac{3}{4}$			6 $\frac{1}{4}$	Brass & Bab.	Solid
GE216-A&C	Arm. P.E.	59127	3 $\frac{1}{4}$	5 $\frac{3}{4}$	4 $\frac{1}{8}$			7 $\frac{7}{8}$	Brass & Bab.	Solid
GE216-A	Axle	60947	5	9	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE216-A	Axle	100059	5	9	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Brass	Split
GE216-C	Axle	100060	5	8	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Brass	Split
GE218-B	Arm. C.E.	100071	3 $\frac{1}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{2}$			6 $\frac{1}{4}$	Brass & Bab.	Solid
GE218-B	Arm. P.E.	100072	3 $\frac{1}{2}$	5 $\frac{3}{4}$	4 $\frac{1}{8}$			6 $\frac{3}{4}$	Brass & Bab.	Solid
GE218-B	Axle	100055	4 $\frac{1}{2}$	9	6	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE218-B	Axle	100061	5	9	6	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Brass	Split
GE219-A&B	Arm. C.E.	100070	2 $\frac{3}{4}$	5 $\frac{1}{4}$	4 $\frac{1}{4}$			6 $\frac{1}{4}$	Mall. I. & Bab.	Solid
GE219-A&B	Arm. P.E.	100069	3 $\frac{1}{4}$	5 $\frac{3}{4}$	4 $\frac{1}{4}$			7 $\frac{1}{4}$	Mall. I. & Bab.	Solid
GE219-A&B	Axle	100916	4	9	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE219-A&B	Axle	100053	4 $\frac{1}{2}$	9	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split
GE219-A&B	Axle	100057	5	9	6 $\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$	8 $\frac{3}{4}$	Mall. I. & Bab.	Split

* Diam. of wearing surface on flange 8 $\frac{1}{4}$ in.

RAILWAY MOTOR BRUSH-HOLDERS



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Motor	Volts	Illustration Fig. No.	CAT. NO. STUD OR SUPPORT COM- PLETE WITH BRUSH-HOLDER		Cat. No. Yoke Com- plete with Brush- Holder	CAT. NO. BRUSH-HOLDER COMPLETE		Cat. No. Tension Spring
			Right-Hand	Left-Hand		Right-Hand	Left-Hand	
NWP2½	250/500	5	100450	100450		100451	100451	100452
CB14	250/500	5	51950	51951		51958	51958	51961
CB14	250/500	3			45399	45401	45402	45407
CB15	250/500	5	30762	30763		51958	51958	51961
GE800 Form B & CO2005	500	3			17488	17238	17239	13731
GE800 Form B & CO2005	250	3			111881	111882	111883	13731
GE1000	500	3			14752	14755	14756	14763
GE1200	500	3			18045	18048	18048	19348
GE51 & CO2001	250	3			100453	100455	100457	100459
GE51 & CO2001	500	3			100454	100456	100458	100460
GE52 & CO2002	250	3			47886	47887	47888	45174
GE52 & CO2002	500	3			15604	15627	15628	14763
GE53	250	4			52547	52552	52552	b52553
GE53	500	3			k52531	52534	52535	14763
GE53	500	3			y52532	52534	52535	14763
GE54	500	3			11338	11339	11340	45182
GE55 & CO2003	500	7	50512	50513		50516	50516	50520
GE57 & CO2007	250	3			100461	100462	100463	100464
GE57 & CO2007	500	3			*38580	19213	19214	55853

* With barrel type spring.

k Three, four and five turn armatures.

y Six turn armature.

b Pressure spring complete.

RAILWAY MOTOR BRUSH-HOLDERS

Motor	Volts	Illustration Fig. No.	CAT. NO. STUD OR SUPPORT COM- PLETE WITH BRUSH- HOLDER		Cat. No. Yoke Com- plete with Brush- Holders	CAT. NO. BRUSH-HOLDER COM- PLETE		Cat. No. Tension Spring
			Right-Hand	Left-Hand		Right-Hand	Left-Hand	
GE57 & CO2007	500	3			†50226	50228	50229	14763
GE58 & CO2004	250	3			Δ66679	66681	66683	14763
GE58 & CO2004	250	3			§66680	66682	66684	14763
GE58 & CO2004	500	3			50418	14755	14756	14763
GE59	250	3			45152	45154	45155	45160
GE59	500	3			100465	100466	100467	45160
GE60	250	3			52272	52274	52275	14763
GE60	500	3			52271	15627	15628	14763
GE61	250	4			39344	39348	39348	b39355
GE61	500	4			39345	39349	39349	b39355
GE66	500	1	24577	24578		24581	24582	{ h24588 a24589
GE67	500	3			*47795	47797	47798	55853
GE67	500	3			§47794	55847	55848	55853
GE69	500	7	38641	38642		38643	38644	{ h38645 a38646
GE70	500	3			34059	34060	34061	55853
GE73	500	1	32361	32362		32365	32366	{ h32372 a32373
GE74	500	1	35156	35157		35159	35160	{ h35167 a35168
GE77	250	3			45169	52274	45171	45174
GE77	500	3			45168	15627	45170	14763
GE78	500	3			100468	100469	100470	55853
GE79	250	4			c100471	100475	100475	100477
GE79	250	4			d100472	100476	100476	100478
GE79	500	4			c100473	100475	100475	100477
GE79	500	4			d100474	100476	100476	100478
GE80	500	3			40400	34060	34061	55853
GE81	500	3			45180	11339	11340	45182
GE87	500	3			45188	45190	45191	55853
GE88	500	2	108032	108032		108033	108033	108034
GE90-A	500	3			45200	45202	45203	55853
GE90-B	500	3			45335	45202	45203	55853
GE95	250		100479	100481		100483	100485	100487
GE95	500		100480	100482		100484	100486	100487
GE96	250		x100488	x100489		100496	100497	100504
GE96	250		100490	100491		100498	100499	100487
GE96	500		x100492	x100493		100500	100501	100504
GE96	500		100494	100495		100502	100503	100487
GE97	250	3			100506	100508	100510	100512
GE97	500	3			100507	100509	100511	55853
GE202	600	3			60338	59130	59131	59138
GE204	600	3			100513	100514	100515	55853
GE205	600	8	64127	64129		64138	64141	55853
GE205	600/1200	8	49741	49742		64136	64139	55853
GE205	1200	8	64126	64128		64137	64140	45182
GE207	600	8	{ k108035 m108037			108039	108039	{ e38646 f38645
GE207	600/1200	8	{ k108036 m108038			108040	108040	{ e38646 f38645
GE210-A	600	3			59886	59887	59888	45182
GE210-B, C, D & E	600	2	†112124	†112124		112125	112125	108034
GE210-B, C, D & E	600	2	||100516	||100516		100517	100517	59138
GE213	600	3			59128	59130	59131	59138
GE216	600	2	†108041	†108041		108042	108042	108034
GE216	600	2	||61175	||61175		61182	61182	111856
GE217	600/1200	2	108043	108043		108044	108044	108034
GE218	600	2	108045	108045		108046	108046	108034
GE219	600	2	†108041	†108041		108042	108042	108034
GE219	600	2	||61175	||61175		61182	61182	111856

* Four turn armature.

† With old type spring.

‡ New style with straight terminal.

§ Three turn armature.

|| Old style with bent terminal.

Δ Two turn armatures.

a Left-hand spring.

b Pressure spring complete.

c Single stud brush-holder.

d Double stud brush-holder.

e Outer for Cat. Nos. 108035 and 108036, Inner for Cat. Nos. 108037 and 108038.

f Inner for Cat. Nos. 108035 and 108036, Outer for Cat. Nos. 108037 and 108038.

h Right-hand spring.

k Upper.

m Lower.

x Metal body only.

RAILWAY MOTOR CARBON BRUSHES

Motor	Voltage	Cat. No.	DIMENSIONS IN INCHES		
			Length	Width	Thickness
NWP2½	250 & 500	100370	2	1 1/8	5/8
*CB14	250 & 500	51971	1 3/4	1 7/8	5/8
CB14	250 & 500	61834	1 3/4	1 7/8	5/8
*CB15	250 & 500	51971	1 3/4	1 7/8	5/8
†GE800 & CO2005	110 & 250	15389	2 1/4	2 1/4	3/4
†GE800 & CO2005	500	17086	2 7/8	2 1/4	3/4
GE1000	500	14764	2 1/4	1 3/8	3/4
GE1000	500	50396	2 1/4	2 3/4	3/4
†GE1200	500	17086	2 7/8	2 1/4	3/4
†GE1200	250	36071	2 1/4	2 1/4	3/4
GE51 & CO2001	500	36063	2 1/4	2	5/8
GE51 & CO2001	250	36062	2 1/4	2	1
*GE51 & CO2001	250	58964	2 1/4	2	1
GE52 & CO2002	500	15698	2 1/4	1 1/4	1 1/2
GE52 & CO2002	500	50395	2 1/4	2 3/4	1 1/2
GE52 & CO2002	250	36064	2 1/4	1 1/4	1
*GE52 & CO2002	250	58965	2 1/4	1 1/4	1
GE53	500	52546	2 1/4	1 1/2	5/8
GE53	250	52563	2 1/4	1 1/2	3/4
*GE53	250	58966	2 1/4	1 1/2	3/4
GE54	500	11347	2 1/4	3	3/4
GE55 & CO2003	500	50534	2	1 3/4	1 1/8
GE55 & CO2003	250	36065	2	1 3/4	1 1/8
GE57 & CO2007	500	18167	2 1/4	1 1/4	1 1/8
GE57 & CO2007	250	36066	2 1/4	1 1/4	1 1/8
*GE57 & CO2007	250	58967	2 1/4	1 1/4	1 1/8
GE58 & CO2004	500	50396	2 1/4	2 3/4	1 1/8
GE58 & CO2004	500	14764	2 1/4	1 3/8	3/4
ΔGE58 & CO2004	110	36068	2 1/4	1 3/8	3/4
°GE58 & CO2004	250	36067	2 1/4	1 3/8	1 1/4
Δ*GE58 & CO2004	250	58968	2 1/4	1 3/8	1 1/4
°*GE58 & CO2004	250	58969	2 1/4	1 3/8	1 1/4
*GE59	250	100371	2 1/4	1 1/4	1 1/4
GE60	500	50395	2 1/4	2 3/4	3/4
GE60	500	15698	2 1/4	1 1/4	1 1/4
GE60	250	52281	2 1/4	1 1/4	1 1/4
GE61	500	36070	2 1/4	2	7/8
GE61	250	36069	2 1/4	2	7/8
GE66	500	24843	2 1/4	3 1/4	1 1/8
GE67	500	55856	2 1/4	3 3/8	1 1/8
GE69	500	36321	2	2 1/4	3/4
GE70	500	34070	2 1/4	1 7/8	3/4
GE73	500	50395	2 1/4	2 3/4	3/4
GE74	500	35176	2 1/4	2 1/4	3/4
GE77	500	50395	2 1/4	2 3/4	3/4
GE77	250	52281	2 1/4	1 1/4	7/8
GE78	500	42909	2 1/4	3 3/8	1 1/8
GE79	250 & 500	100372	2 1/4	1 1/4	1 1/8
GE80	500	34070	2 1/4	1	1 1/8
GE81	500	11347	2 1/4	3	3/4
GE87	500	42911	2 1/4	2	3/4
GE88	500	34070	2 1/4	1 7/8	3/4
GE90	500	42912	2 1/4	1 7/8	7/8
GE95	250	100233	1 1/2	1 1/4	1 1/8
GE96	500	100374	1 1/2	1 1/2	1 1/8
GE96	250	100373	1 1/2	1 1/2	1 1/8
GE97	500	100376	2 1/4	1 3/4	1 1/8
*GE97	250	100375	2 1/4	1 1/2	1
GE202	600	50395	2 1/4	2 3/4	1 1/2
GE204	600	59987	2 1/4	2	1 1/8
GE205	600	100663	2 1/4	2 1/4	1 1/8
GE205	600/1200	49743	2 1/4	1 3/4	1 1/8
GE205	1200	62509	2 1/4	1 1/2	1 1/8
GE207	600	100663	2 1/4	2 1/4	1 1/8
GE207	600/1200	59578	2	2	5/8
GE210	600	59889	2 1/4	1 5/8	3/4
GE213	600	50395	2 1/4	2 3/4	3/4
GE216	600	61176	2 1/4	3	3/4
GE217	600/1200	15698	2 1/4	1 1/4	3/4
GE218	600	107579	2 1/4	3	3/4
GE219	600	61176	2 1/4	3	3/4

* Clip and pig tail.

† Beveled.

Δ 3 turn motor.

° 2 turn motor.

RAILWAY MOTOR GEARS AND PINIONS



The General Electric Company furnishes gears and pinions for both General Electric and Westinghouse motors. Special care is taken to see that the specifications, as issued by the Committee of Maintenance of the American Street Railway Association, are rigidly adhered to. The steel castings are practically free from blow holes; thickness of teeth is carefully checked by gauge and every gear and pinion is run in both directions in a testing machine.

All gears are cast at one of the General Electric Co.'s. steel foundries, where special heats are made for gear castings. Gears for use with motors of 75 h.p. capacity and over are made of a higher carbon content than is generally used, and afterwards annealed in special annealing ovens. By this means higher physical properties are obtained and all shrinkage strains eliminated. To insure full strength in the spokes of solid gears, ribs are cast in the sides and a general endeavor has been made to so distribute the metal that all parts of the gear are as nearly of one thickness as is possible.

Three grades of pinions are listed. Grade "F" pinions, which are especially recommended for all motors of 75 h.p. capacity and over, are noted for their long life, high physical characteristics and great toughness. The steel is carefully selected, and after the pinion has been manufactured it is oil treated, thus considerably increasing its physical properties and toughness.

The Grade "H" pinion is also oil treated, and, while the price is only slightly in advance of the common untreated pinion, its physical characteristics and greater wearing qualities are far in excess of it. We unhesitatingly recommend this pinion for all motors up to 75 h.p. We are also listing our Grade "C" pinions. These pinions are untreated and can be purchased where first cost is the greater consideration.

When ordering gears give S.G. No. and axle diameter, otherwise it will be necessary to return the order for complete information.

GEARS FOR GENERAL ELECTRIC RAILWAY MOTORS

NWP2 1 1/2—4 PITCH—2 1/4 IN. FACE

4-BOLT

SOLID

No. of Teeth	Hub Diameter	Axle Diameter	No.	Axle Diameter	No.
58	4 1/2	2 1/4	*S.G. 2085		

NWP12—use 5 in. hub gears listed for GE800.

CB14 AND 15—4 PITCH—3 IN. FACE

66	4 1/2	2 3/4—3	S.G. 2086		
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WP30 AND 50—3 PITCH—4 1/2 IN. FACE

67	5	3 1/2—3 3/4	S.G. 2001		
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GE800—3 PITCH—4 1/2 IN. FACE

67	5	3 1/2—4	S.G. 2001		
67	6	4 —4 1/2	S.G. 2005	4 —4 1/2	S.G. 3004

In a few cases gears have been furnished for GE800 motors with the end of the hub splined to accommodate the key. Such gears are considered special and furnished only when definitely specified.

*2 bolt gear.

GEARS FOR GENERAL ELECTRIC RAILWAY MOTORS

GE1000—3 PITCH—4 1/2 IN. FACE

4-BOLT

SOLID

No. of Teeth	Hub Diameter	Axle Diameter	No.	Axle Diameter	No.
62	6	3 3/4-4	S.G. 2002	3 3/4-4	S.G. 3001
62	6 1/4	4 1/4-4 1/2	S.G. 2007	4 1/4-4 1/2	S.G. 3006
63	6 1/4	4 1/4-4 1/2	S.G. 2008	4 1/4-4 1/2	S.G. 3007
64	6	3 3/4-4 1/2	S.G. 2003	3 3/4-4 1/2	S.G. 3002
64	6 1/4	3 3/4-4 1/2	S.G. 2009	3 3/4-4 1/2	S.G. 3008
65	6	3 3/4-4 1/2	S.G. 2004	3 3/4-4 1/2	S.G. 3003
65	6 1/4	3 3/4-4 1/2	S.G. 2010	3 3/4-4 1/2	S.G. 3009
67	6	3 3/4-4 1/2	S.G. 2005	3 3/4-4 1/2	S.G. 3004
67	6 1/4	4 1/4-5	S.G. 2011	4 -5	S.G. 3010
69	6	3 3/4-4 1/2	S.G. 2006	3 3/4-4 1/2	S.G. 3005
69	6 1/4	4 -4 1/2	S.G. 2012	4	S.G. 3011
69	6 1/4	4 1/4-5	S.G. 2013	4 1/4-5	S.G. 3012

GE51—use the same gears as for GE57.

GE53—3 PITCH—4 1/2 IN. FACE

64	6	3 3/4-4 1/2	S.G. 2043	3 3/4-4 1/2	S.G. 3045
65	6	3 3/4-4 1/2	S.G. 2044	3 3/4-4 1/2	S.G. 3046
67	6	3 3/4-4 1/2	S.G. 2045	3 3/4-4 1/2	S.G. 3047
67	6 1/4	4 -4 1/2	S.G. 2047	4 -4 1/2	S.G. 3049
69	6	4 -4 1/2	S.G. 2046	4 -4 1/2	S.G. 3048
69	6 1/4			4 -4 1/2	S.G. 3050

GE57—3 PITCH—5 IN. FACE

57	6 1/4	3 3/4-5	S.G. 2014	4 -5	S.G. 3013
59	6 1/4	3 3/4-5	S.G. 2015	4 -5	S.G. 3014
60	8	5 -6	S.G. 2021	5 -6	S.G. 3020
61	6 1/4	4 -5	S.G. 2016	4 -5	S.G. 3015
63	8				
63	8	5 -6	S.G. 2024	5 -6	S.G. 3023
64	6 1/4	4 -5	S.G. 2017	4 -5	S.G. 3016
64	8	4 -5	S.G. 2025	4 -5	S.G. 3024
64	8	5 1/4-6	S.G. 2026	5 1/4-6	S.G. 3025
65	8	4 1/4-5	S.G. 2027	4 1/4-5	S.G. 3026
65	8	5 1/4-6	S.G. 2028	5 1/4-6	S.G. 3027
66	6 1/4	4 -5	S.G. 2018	4 -5	S.G. 3017
66	7 1/2	5	S.G. 2019	5	S.G. 3018
69	6 1/4	3 3/4-4 1/2	S.G. 2020	3 3/4-4 1/2	S.G. 3019
69	8	4 -5 1/2	S.G. 2031	4 -4 1/2	S.G. 3031
69	8			5 -6	S.G. 3032
71	8	4 -4 1/2	S.G. 2033	4 -4 1/2	S.G. 3034
71	8	5 -6	S.G. 2034	5 -6	S.G. 3035

GE58—use the 6 in. hub gears listed for GE53.

GE59—3 PITCH—4 IN. FACE

69	6	3 1/2-4 1/2	S.G. 2048	3 1/2-4 1/2	S.G. 3051
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GE60—use the 6 in. hub gears listed for GE53.

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR GENERAL ELECTRIC RAILWAY MOTORS**GE61—3 PITCH—3 1/2 IN. FACE****4-BOLT****SOLID**

No. of Teeth	Hub Diameter	Axle Diameter	No.	Axle Diameter	No.
81	6	4 -4½	S.G. 2049	4 -4½	S.G. 3052

GE62—3 PITCH—4 1/2 IN. FACE

62	6	3½-4½	S.G. 2002	3½-4½	S.G. 3001
64	6	3½-4½	S.G. 2003	3½-4½	S.G. 3002
65	6	3½-4½	S.G. 2004	3½-4½	S.G. 3003
67	6	3½-4½	S.G. 2005	3½-4½	S.G. 3004

GE63—use the same gears as for GE62.
GE67—use the same gears as for GE1000.
GE70—use the same gears as for GE80.

GE73—2 1/2 PITCH—5 IN. FACE

46	8½			5½-6	S.G. 3053
49	8½	5½-6	S.G. 2050	5½-6	S.G. 3054
51	8½	5½-7	S.G. 2051	5½-7	S.G. 3055
53	8½	5½-6½	S.G. 2052	5 -6½	S.G. 3056
54	8½	5½-6	S.G. 2053	5½-6	S.G. 3057
55	8½	5½-6	S.G. 2054	5½-6	S.G. 3058
56	8½	5 -6½	S.G. 2055	5 -6½	S.G. 3059
57	8½	6 -7	S.G. 2056	6½-7	S.G. 3060
58	8½	5½-6½	S.G. 2057	5½-6½	S.G. 3061

GE73—3 PITCH—5 IN. FACE

56	8½	5 -6	S.G. 2058	5 -6	S.G. 3062
62	8½	4½-6	S.G. 2059	5½-6	S.G. 3063
68	8½	5 -5½	S.G. 2060	5 -5½	S.G. 3064
73	8½	4½-5½	S.G. 2061	4½-5½	S.G. 3065
73	8½	5½-6½	S.G. 2062	5½-6½	S.G. 3066

GE74—3 PITCH—5 1/2 IN. FACE

64	8½	5 -6	S.G. 2063	5 -6	S.G. 3067
65	8½	5 -6	S.G. 2064	5 -6	S.G. 3068
67	8½	5½-6½	S.G. 2065	5½-6½	S.G. 3069
68	8½	5 -6	S.G. 2066	5 -6	S.G. 3070
70	8½	5 -6	S.G. 2067	5 -6	S.G. 3071
73	8½	5 -6	S.G. 2068	5 -6	S.G. 3072

GE77—3 PITCH—3 1/2 IN. FACE

67	6	3½-4	S.G. 2069	3½-4½	S.G. 3073
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GE78—3 PITCH—4 1/2 IN. FACE

69	6½	3½-4½	S.G. 2012	3½-4	S.G. 3011
69	6½	4½-5	S.G. 2013	4½-5	S.G. 3012

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR GENERAL ELECTRIC RAILWAY MOTORS**GE79—3 PITCH—3 IN. FACE****4-BOLT****SOLID**

No. of Teeth	Hub Diameter	Axle Diameter	No.	Axle Diameter	No.
69	6	3½-4½	*S.G. 2070		

GE80—3 PITCH—5 IN. FACE

64	8	4 -5	S.G. 2035	4 -5	S.G. 3036
64	8	5¼-5½	S.G. 2036	5¼-5½	S.G. 3037
65	8	4 -5	S.G. 2027	4 -5	S.G. 3038
67	8	4 -4½	S.G. 2037	4 -5	S.G. 3039
67	8	5 -5½	S.G. 2038	5¼-5½	S.G. 3040
69	8	3¾-4¾	S.G. 2039	4 -5	S.G. 3041
69	8	5 -5½	S.G. 2040	5¼-5½	S.G. 3042
71	8	4 -5	S.G. 2041	4 -5	S.G. 3043
71	8	5¼-6	S.G. 2042	5¼-6	S.G. 3044

GE81—use the same gears as for GE1000.

GE87—3 PITCH—5 IN. FACE

61	8	4½-5½	S.G. 2022	4½-5½	S.G. 3021
62	8	4 -5	S.G. 2023	4 -5	S.G. 3022
63	8	4½-6	S.G. 2024	4½-6	S.G. 3023
64	8	4 -5	S.G. 2025	4 -5	S.G. 3024
64	8	5¼-6	S.G. 2026	5¼-6	S.G. 3025
65	8	4½-5	S.G. 2027	5½-6	S.G. 3027
65	8	5½	S.G. 2028		
66	8	4½-5½	S.G. 2029	5¼-6	S.G. 3028
67	8	4 -5½	S.G. 2030	4 -5	S.G. 3029
67	8			5¼-5½	S.G. 3030
69	8	4 -5½	S.G. 2031	4 -4½	S.G. 3031
69	8			5 -5½	S.G. 3032
70	8	4½-5½	S.G. 2032	4½-5½	S.G. 3033
71	8	4 -4½	S.G. 2033	4 -4½	S.G. 3034
71	8	5 -6	S.G. 2034	5 -6	S.G. 3035

GE88—use the same gears as for GE216.

GE90—use the same gears as for GE87.

GE95—4 PITCH—2 IN. FACE

58	4½	2¾-3	*S.G. 2071		
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GE96—4 PITCH—3 IN. FACE

66	5¼	3¼-4	*S.G. 2072		
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GE97—3 PITCH—5 IN. FACE

72	8	4½-5½	S.G. 2073	4½-5½	S.G. 3074
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GE202—use the same gears as for GE87.

*2 bolt gear.

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR GENERAL ELECTRIC RAILWAY MOTORS

GE204—2 1/2 PITCH—5 IN. FACE

4-BOLT

SOLID

No. of Teeth	Hub Diameter	Axle Diameter	No.	Axle Diameter	No.
55	9	5 1/4-6	S.G. 2074	5 1/4-6	S.G. 3075
56	9	5-6	S.G. 2075	6 1/4-7	S.G. 3076
58	9	5 1/4-6 1/2	S.G. 2076	6 1/4-7	S.G. 3077
60	9	5-5 1/2	S.G. 2077	6-7	S.G. 3078

GE205—2 1/2 PITCH—5 IN. FACE

47	8 1/4			6 1/4-7 1/2	S.G. 3091
50	9 1/4			6 1/4-7 1/2	S.G. 3092
51	8 1/4	5 1/4-7	S.G. 2051	5 1/4-7	S.G. 3055
51	9 1/4			6 1/4-7 1/2	S.G. 3093
53	8 1/4	5 1/4-6 1/2	S.G. 2052	5 1/4-6 1/2	S.G. 3056
53	9 1/4			6 1/4-7 1/2	S.G. 3094
54	8 1/4	5 1/4-6	S.G. 2053	5 1/4-6	S.G. 3057
55	8 1/4	5 1/4-6	S.G. 2054	5 1/4-6 1/2	S.G. 3058
56	8 1/4	5-6 1/2	S.G. 2055	5-6 1/2	S.G. 3059
57	8 1/4	5 1/4-5 3/4	S.G. 2093	5 1/4-6 1/4	S.G. 3095
57	8 1/4	6-7	S.G. 2056	6 1/4-7	S.G. 3060
57	9 1/4	6 1/4-7 1/2	S.G. 2094	6 1/4-7 1/2	S.G. 3096
58	8 1/4	6-6 1/2	S.G. 2057	6-6 1/2	S.G. 3061

GE210—3 PITCH—5 IN. FACE

59	10			5 1/4-6 1/2	S.G. 3084
63	10	5-6	S.G. 2089	4 1/4-5 1/2	S.G. 3085
66	10			5-6	S.G. 3087
67	10			5-6	S.G. 3088
68	10	5-6	S.G. 2090		
69	8	4 1/2-5 1/2	S.G. 2031	4 1/2-4 3/4	S.G. 3031
69	10	4 1/2-5 1/2	S.G. 2083	4 1/2-5 1/2	S.G. 3086
69	10	5 1/2-6	S.G. 2091	5 1/2-6	S.G. 3089
71	10	4-5	S.G. 2084	4 1/2-5 1/2	S.G. 3090
71	10	5 1/4-6	S.G. 2092		

GE213—3 PITCH—5 IN. FACE

69	8	5-5 1/2	S.G. 2031	5 1/4-5 1/2	S.G. 3032
71	8	5 1/4-5 3/4	S.G. 2034	5 1/4-5 3/4	S.G. 3035

GE216—3 PITCH—5 IN. FACE

67	9	5-6	S.G. 2078	5-6	S.G. 3079
69	9	4-5	S.G. 2079	4-5	S.G. 3080
69	9	5 1/4-6	S.G. 2080	5 1/4-6	S.G. 3081
71	9	4-5	S.G. 2081	4-5	S.G. 3082
71	9	5 1/4-6	S.G. 2082	5 1/4-6	S.G. 3083

GE217—use the same gears as for GE210.

GE218

71	9	4 1/2-5 1/2	S.G. 2087		
71	9	5 1/4-6	S.G. 2088		

GE219—use the same gears as for GE216.

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

PINIONS FOR GENERAL ELECTRIC RAILWAY MOTORS

Unless otherwise specified in the following tables, all pinions are taper-bored and not counter-bored. In ordering specify the Cat. No. of the pinion wanted and also its "Grade." Three Grades are offered as shown on page 381.

NWP2 1 1/2—4 PITCH—2 1/4 IN. FACE

No. of Teeth	Cat. No.	Bore
14	18488	1 1/4" straight

LWP5—4 PITCH—3 IN. FACE

14	18490	1 1/4" straight
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CB14 AND 15—4 PITCH—3 IN. FACE

14	18572	1.8093"
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WP30 AND 50—3 PITCH—4 1/2 IN. FACE

14	18537	2 1/8" straight
14	15677	2 1/8" straight
17	18500	2 1/8" straight

GE800—3 PITCH—4 1/2 IN. FACE

14	18537	2 1/8" straight
14	15677	2 1/8" straight
14	19351	2 1/8" counterbored
16	18580	2 1/8" counterbored
17	18500	2 1/8" straight
17	18501	2 1/8" taper counterbored
20	18560	2 1/8" taper counterbored

GE1000—3 PITCH—4 1/2 IN. FACE

15	28485	2 1/8"
15	18494	2 1/8"
17	18502	2 1/8"
19	18506	2 1/8"
20	28428	2 1/8"
21	18508	2 1/8"
22	18510	2 1/8"
23	18512	2 1/8"

GE1200—3 PITCH—5 IN. FACE

17	18043	2 1/4"
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GE51—Same as GE57

GE52—3 PITCH—4 1/2 IN. FACE

14	19351	2 1/8" counterbored
16	18580	2 1/8" counterbored
17	18501	2 1/8" counterbored
19	18571	2 1/8" counterbored
20	18560	2 1/8" counterbored

PINIONS FOR GENERAL ELECTRIC RAILWAY MOTORS**GE53—3 PITCH—4 1/2 IN. FACE**

No. of Teeth	Cat. No.	Bore
15	18469	2 $\frac{3}{4}$ " counterbored
17	18538	2 $\frac{3}{4}$ " counterbored

GE54—3 PITCH—4 1/2 IN. FACE

14	19351	2 $\frac{5}{16}$ " counterbored
17	18501	2 $\frac{5}{16}$ " counterbored

GE55—2 1/2 PITCH—5 1/4 IN. FACE

17	18548	3 $\frac{1}{2}$ "
18	18554	3 $\frac{1}{2}$ "
21	18558	3 $\frac{1}{2}$ "
26	18986	3 $\frac{1}{2}$ "

GE57—3 PITCH—5 IN. FACE

16	18541	3"
17	18938	3"
18	18946	3"
19	18556	3"
21	18546	3"
22	18544	3"
23	49858	3"
24	18547	3"
26	18543	3"
27	28322	3"
28	18542	3"

GE58—3 PITCH—4 1/2 IN. FACE

15	18494	2 $\frac{3}{4}$ "
15	18555	2 $\frac{3}{4}$ " counterbored
17	18502	2 $\frac{3}{4}$ "
19	18506	2 $\frac{3}{4}$ "
20	28428	2 $\frac{3}{4}$ "
21	18508	2 $\frac{3}{4}$ "
22	18510	2 $\frac{3}{4}$ "
23	18512	2 $\frac{3}{4}$ "

Unless otherwise specified in the following tables, all pinions are taper-bored and not counter-bored. In ordering specify the Cat. No. of the pinion wanted and also its "Grade." Three Grades are offered as shown on page 381.

GE59—3 PITCH—4 IN. FACE

15	18990	2 $\frac{3}{4}$ " counterbored
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GE60—3 PITCH—4 1/2 IN. FACE

14	19351	2 $\frac{5}{16}$ " counterbored
16	18580	2 $\frac{5}{16}$ " counterbored

PINIONS FOR GENERAL ELECTRIC RAILWAY MOTORS**GE74—3 PITCH—5 1/2 IN. FACE**

No. of Teeth	Cat. No.	Bore
16	28399	3" counterbored
19	28440	3" counterbored
20	28397	3" counterbored
21	28396	3" counterbored
22	28414	3" counterbored
24	28358	3" counterbored
25	28455	3" counterbored
26	28418	3" counterbored
28	28359	3" counterbored

GE76—2 1/2 PITCH—5 1/4 IN. FACE

18	28433	3 1/8" counterbored
19	28474	3 1/8" counterbored

GE78—3 PITCH—4 1/2 IN. FACE

14	28415	2 1/8"
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GE79—3 PITCH—3 IN. FACE

14	28416	2 3/4" counterbored
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GE80—Same as GE70**GE81—Same as GE54**

Unless otherwise specified in the following tables, all pinions are taper-bored and not counter-bored. In ordering specify the Cat. No. of the pinion wanted and also its "Grade." Three Grades are offered as shown on page 381.

GE87—3 PITCH—5 IN. FACE

16	28441	3 1/8"
18	28457	3 1/8"
20	28458	3 1/8"
21	28444	3 1/8"
23	28459	3 1/8"
24	28454	3 1/8"
25	49855	3 1/8"
26	28478	3 1/8"
28	28479	3 1/8"

GE88—Same as GE216**GE90—Same as GE70****GE95—4 PITCH—2 IN. FACE**

14	28471	1 1/4" counterbored
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GE96—4 PITCH—3 IN. FACE

14	28472	2 1/8" counterbored
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GEARS FOR WESTINGHOUSE RAILWAY MOTORS

WH3—3 PITCH—5 IN. FACE

SPLIT

SOLID

No. of Teeth	Hub Bore	No.	Hub Bore	No.
62	$3\frac{1}{4}$ -4	S.G. 4001	$3\frac{1}{4}$ -4	S.G. 5001
62	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4002	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5002

WH12A—3 PITCH—5 IN. FACE

58	$3\frac{1}{4}$ -4	S.G. 4003	$3\frac{1}{4}$ -4	S.G. 5003
58	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4004	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5004
60	$3\frac{1}{4}$ -4	S.G. 4005	$3\frac{1}{4}$ -4	S.G. 5005
60	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4006	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5006
62	$3\frac{1}{4}$ -4	S.G. 4007	$3\frac{1}{4}$ -4	S.G. 5007
62	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4008	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5008
64	$3\frac{1}{4}$ -4	S.G. 4009	$3\frac{1}{4}$ -4	S.G. 5009
64	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4010	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5010
65	$3\frac{1}{4}$ -4	S.G. 4011	$3\frac{1}{4}$ -4	S.G. 5011
65	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4012	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5012
66	$3\frac{1}{4}$ -4	S.G. 4013	$3\frac{1}{4}$ -4	S.G. 5013
66	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4014	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5014
67	$3\frac{1}{4}$ -4	S.G. 4015	$3\frac{1}{4}$ -4	S.G. 5015
67	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4016	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5016
68	$3\frac{1}{4}$ -4	S.G. 4017	$3\frac{1}{4}$ -4	S.G. 5017
68	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4018	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5018

WH38—3 PITCH—5 IN. FACE

58	$3\frac{1}{4}$ -4	S.G. 4019	$3\frac{1}{4}$ -4	S.G. 5019
58	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4020	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5020
60	$3\frac{1}{4}$ -4	S.G. 4021	$3\frac{1}{4}$ -4	S.G. 5021
60	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4022	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5022
62	$3\frac{1}{4}$ -4	S.G. 4023	$3\frac{1}{4}$ -4	S.G. 5023
62	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4024	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5024
64	$3\frac{1}{4}$ -4	S.G. 4025	$3\frac{1}{4}$ -4	S.G. 5025
64	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4026	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5026
66	$3\frac{1}{4}$ -4	S.G. 4027	$3\frac{1}{4}$ -4	S.G. 5027
66	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4028	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5028
68	$3\frac{1}{4}$ -4	S.G. 4029	$3\frac{1}{4}$ -4	S.G. 5029
68	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4030	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5030

WH49—3 PITCH—5 IN. FACE

58	$3\frac{1}{4}$ -4	S.G. 4031	$3\frac{1}{4}$ -4	S.G. 5031
58	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4032	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5032
60	$3\frac{1}{4}$ -4	S.G. 4033	$3\frac{1}{4}$ -4	S.G. 5033
60	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4034	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5034
62	$3\frac{1}{4}$ -4	S.G. 4035	$3\frac{1}{4}$ -4	S.G. 5035
62	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4036	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5036
64	$3\frac{1}{4}$ -4	S.G. 4037	$3\frac{1}{4}$ -4	S.G. 5037
64	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4038	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5038
65	$3\frac{1}{4}$ -4	S.G. 4039	$3\frac{1}{4}$ -4	S.G. 5039
65	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4040	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5040
66	$3\frac{1}{4}$ -4	S.G. 4041	$3\frac{1}{4}$ -4	S.G. 5041
66	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4042	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5042
67	$3\frac{1}{4}$ -4	S.G. 4043	$3\frac{1}{4}$ -4	S.G. 5043
67	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4044	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5044
68	$3\frac{1}{4}$ -4	S.G. 4045	$3\frac{1}{4}$ -4	S.G. 5045
68	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 4046	$4\frac{1}{4}$ - $4\frac{3}{4}$	S.G. 5046

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR WESTINGHOUSE RAILWAY MOTORS

WH50—2 1/2 PITCH—5 IN. FACE

SPLIT			SOLID		
No. of Teeth	Hub Bore	No.	Hub Bore	No.	
50			5 -5 $\frac{1}{4}$		S.G. 5047
50			6 -6 $\frac{1}{4}$		S.G. 5048
51			5 -5 $\frac{1}{4}$		S.G. 5049
51			6 -6 $\frac{1}{4}$		S.G. 5050
52			5 -5 $\frac{1}{4}$		S.G. 5051
52			6 -6 $\frac{1}{4}$		S.G. 5052
54			5 -5 $\frac{1}{4}$		S.G. 5053
54			6 -6 $\frac{1}{4}$		S.G. 5054

WH56—3 PITCH—5 IN. FACE

48			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5055
50			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5056
52			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5057
54			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5058
56			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5059
58			3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5060
60	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4047	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5061
62	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4048	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5062
63	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4049	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5063
64	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4050	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5064
65	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4051	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5065
66	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4052	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5066
67	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4053	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5067
68	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4054	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5068

W-68—use same gears as for W-38.

WH76—2 1/2 PITCH—5 IN. FACE

52	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4055	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5069
52	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4056	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5070
54	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4057	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5071
54	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4058	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5072
56	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4059	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5073
56	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4060	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5074
58	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4061	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5075
58	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4062	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5076
60	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4063	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5077
60	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4064	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5078
62	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4065	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5079
62	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4066	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5080
63	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4067	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5081
63	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4068	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5082
64	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4069	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5083
64	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4070	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5084
66	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4071	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5085
66	5 $\frac{1}{2}$ -6 $\frac{1}{2}$	S.G. 4072	5 $\frac{1}{2}$ -6 $\frac{1}{2}$		S.G. 5086

WH92—3 PITCH—5 IN. FACE

58	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4073	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5087
58	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4074	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5088
60	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4075	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5089
60	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4076	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5090
62	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4077	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5091
62	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4078	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5092
64	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4079	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5093
64	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4080	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5094
66	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4081	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5095
66	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4082	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 4096
68	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4083	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5097
68	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4084	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5098
69	3 $\frac{1}{2}$ -4 $\frac{1}{2}$	S.G. 4085	3 $\frac{1}{2}$ -4 $\frac{1}{2}$		S.G. 5099
69	4 $\frac{1}{2}$ -5 $\frac{1}{2}$	S.G. 4086	4 $\frac{1}{2}$ -5 $\frac{1}{2}$		S.G. 5100

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR WESTINGHOUSE RAILWAY MOTORS

WH93—3 PITCH—5 IN. FACE

SPLIT

SOLID

No. of Teeth	Hub Bore	No.	Hub Bore	No.
54			$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5101
54			$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5102
54			$5\frac{1}{2}-6$	S.G. 5103
57	$3\frac{1}{2}-4$	S.G. 4087	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5104
57			$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5105
57			$5\frac{1}{2}-6$	S.G. 5106
58	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4088	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5107
58			$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5108
58			$5\frac{1}{2}-6$	S.G. 5109
59	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4089	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5110
59			$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5111
59			$5\frac{1}{2}-6$	S.G. 5112
60	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4090	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5113
60			$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5114
60			$5\frac{1}{2}-6$	S.G. 5115
61	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4091	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5116
61	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4092	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5117
61			$5\frac{1}{2}-6$	S.G. 5118
62	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4093	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5119
62	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4094	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5120
62			$5\frac{1}{2}-6$	S.G. 5121
63	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4095	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5122
63	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4096	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5123
63			$5\frac{1}{2}-6$	S.G. 5124
64	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4097	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5125
64	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4098	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5126
64			$5\frac{1}{2}-6$	S.G. 5127
65	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4099	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5128
65	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4100	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5129
65			$5\frac{1}{2}-6$	S.G. 5130
66	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4101	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5131
66	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4102	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5132
66			$5\frac{1}{2}-6$	S.G. 5133
67	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4103	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5134
67	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4104	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5135
67			$5\frac{1}{2}-6$	S.G. 5136
68	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4105	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5137
68	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4106	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5138
68			$5\frac{1}{2}-6$	S.G. 5139
69	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4107	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5140
69	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4108	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5141
69			$5\frac{1}{2}-6$	S.G. 5142
70	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4109	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5143
70	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4110	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5144
70			$5\frac{1}{2}-6$	S.G. 5145
71	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 4111	$3\frac{1}{2}-4\frac{1}{2}$	S.G. 5146
71	$4\frac{1}{2}-5\frac{1}{2}$	S.G. 4112	$4\frac{3}{4}-5\frac{1}{2}$	S.G. 5147
71			$5\frac{1}{2}-6$	S.G. 5148

WH101—3 PITCH—5 IN. FACE

58	$3\frac{1}{2}-4$	S.G. 4113	$3\frac{1}{2}-4$	S.G. 5149
58	$4\frac{1}{2}-5$	S.G. 4114	$4\frac{1}{2}-5$	S.G. 5150
60	$3\frac{1}{2}-4$	S.G. 4115	$3\frac{1}{2}-4$	S.G. 5151
60	$4\frac{1}{2}-5$	S.G. 4116	$4\frac{1}{2}-5$	S.G. 5152
61	$3\frac{1}{2}-4$	S.G. 4117	$3\frac{1}{2}-4$	S.G. 5153
61	$4\frac{1}{2}-5$	S.G. 4118	$4\frac{1}{2}-5$	S.G. 5154
62	$3\frac{1}{2}-4$	S.G. 4119	$3\frac{1}{2}-4$	S.G. 5155
62	$4\frac{1}{2}-5$	S.G. 4120	$4\frac{1}{2}-5$	S.G. 5156
64	$3\frac{1}{2}-4$	S.G. 4121	$3\frac{1}{2}-4$	S.G. 5157
64	$4\frac{1}{2}-5$	S.G. 4122	$4\frac{1}{2}-5$	S.G. 5158
65	$3\frac{1}{2}-4$	S.G. 4123	$3\frac{1}{2}-4$	S.G. 5159

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

GEARS FOR WESTINGHOUSE RAILWAY MOTORS

WH101—3 PITCH—5 IN. FACE—(Concluded)

SPLIT

SOLID

No. of Teeth	Hub Bore	No.	Hub Bore	No.
65	4 $\frac{1}{2}$ -5	S.G. 4124	4 $\frac{1}{2}$ -5	S.G. 5160
66	3 $\frac{1}{2}$ -4	S.G. 4125	3 $\frac{1}{2}$ -4	S.G. 5161
66	4 $\frac{1}{2}$ -5	S.G. 4126	4 $\frac{1}{2}$ -5	S.G. 5162
67	3 $\frac{1}{2}$ -4	S.G. 4127	3 $\frac{1}{2}$ -4	S.G. 5163
67	4 $\frac{1}{2}$ -5	S.G. 4128	4 $\frac{1}{2}$ -5	S.G. 5164
68	3 $\frac{1}{2}$ -4	S.G. 4129	3 $\frac{1}{2}$ -4	S.G. 5165
68	4 $\frac{1}{2}$ -5	S.G. 4130	4 $\frac{1}{2}$ -4	S.G. 5166
69	3 $\frac{1}{2}$ -4	S.G. 4131	3 $\frac{1}{2}$ -4	S.G. 5167
69	4 $\frac{1}{2}$ -5	S.G. 4132	4 $\frac{1}{2}$ -5	S.G. 5168

WH112—3 PITCH—5 IN. FACE

54			3 $\frac{1}{2}$ -5	S.G. 5169
54			5 $\frac{1}{2}$ -6	S.G. 5170
57			3 $\frac{1}{2}$ -5	S.G. 5171
57			5 $\frac{1}{2}$ -6	S.G. 5172
58			3 $\frac{1}{2}$ -5	S.G. 5173
58			5 $\frac{1}{2}$ -6	S.G. 5174
59			3 $\frac{1}{2}$ -5	S.G. 5175
59			5 $\frac{1}{2}$ -6	S.G. 5176
60	4 -5	S.G. 4133	3 $\frac{1}{2}$ -5	S.G. 5177
60			5 $\frac{1}{2}$ -6	S.G. 5178
61	4 -5	S.G. 4134	3 $\frac{1}{2}$ -5	S.G. 5179
61			5 $\frac{1}{2}$ -6	S.G. 5180
62	4 -5	S.G. 4135	3 $\frac{1}{2}$ -5	S.G. 5181
62			5 $\frac{1}{2}$ -6	S.G. 5182
63	4 -5	S.G. 4136	3 $\frac{1}{2}$ -5	S.G. 5183
63			5 $\frac{1}{2}$ -6	S.G. 5184
64	4 -5	S.G. 4137	3 $\frac{1}{2}$ -5	S.G. 5185
64			5 $\frac{1}{2}$ -6	S.G. 5186
65	4 -5 $\frac{1}{2}$	S.G. 4138	3 $\frac{1}{2}$ -5	S.G. 5187
65	5 $\frac{1}{2}$ -6	S.G. 4139	5 $\frac{1}{2}$ -6	S.G. 5188
66	4 -5 $\frac{1}{2}$	S.G. 4140	3 $\frac{1}{2}$ -5	S.G. 5189
66	5 $\frac{1}{2}$ -6	S.G. 4142	5 $\frac{1}{2}$ -6	S.G. 5190
67	4 -5 $\frac{1}{2}$	S.G. 4143	3 $\frac{1}{2}$ -5	S.G. 5191
67	5 $\frac{1}{2}$ -6	S.G. 4144	5 $\frac{1}{2}$ -6	S.G. 5192
68	4 -5 $\frac{1}{2}$	S.G. 4145	3 $\frac{1}{2}$ -5	S.G. 5193
68	5 $\frac{1}{2}$ -6	S.G. 4146	5 $\frac{1}{2}$ -6	S.G. 5194
69	4 -5 $\frac{1}{2}$	S.G. 4147	3 $\frac{1}{2}$ -5	S.G. 5195
69	5 $\frac{1}{2}$ -6	S.G. 4148	5 $\frac{1}{2}$ -6	S.G. 5196
70	4 -5 $\frac{1}{2}$	S.G. 4149	3 $\frac{1}{2}$ -5	S.G. 5197
70	5 $\frac{1}{2}$ -6	S.G. 4150	5 $\frac{1}{2}$ -6	S.G. 5198
71	4 -5 $\frac{1}{2}$	S.G. 4151	3 $\frac{1}{2}$ -5	S.G. 5199
71	5 $\frac{1}{2}$ -6	S.G. 4152	5 $\frac{1}{2}$ -6	S.G. 5200
73	4 -5 $\frac{1}{2}$	S.G. 4153	3 $\frac{1}{2}$ -5	S.G. 5201
73	5 $\frac{1}{2}$ -6	S.G. 4154	5 $\frac{1}{2}$ -6	S.G. 5202

WH113—2 1/2 PITCH—5 1/4 IN. FACE

58		6 $\frac{1}{2}$ -7	S.G. 5203
58		7 $\frac{1}{2}$ -8	S.G. 5204
59		6 $\frac{1}{2}$ -7	S.G. 5205
59		7 $\frac{1}{2}$ -8	S.G. 5206
63		6 $\frac{1}{2}$ -7	S.G. 5207
63		7 $\frac{1}{2}$ -8	S.G. 5208
65		6 $\frac{1}{2}$ -7	S.G. 5209
65		7 $\frac{1}{2}$ -8	S.G. 5210

In ordering specify the S.G. number of the gear wanted and also the exact axle diameter.

PINIONS FOR WESTINGHOUSE RAILWAY MOTORS

In ordering specify the Cat. No. of the pinion wanted and also its "Grade." Three Grades are offered as shown on page 381.

WH3—3 PITCH—5 IN. FACE

No. of Teeth	Cat. No.	Bore
18	49870	2 $\frac{1}{2}$

WH12—3 PITCH—5 IN. FACE

14	49851	2 $\frac{3}{4}$
15	89601	2 $\frac{3}{4}$
16	89605	2 $\frac{3}{4}$
17	89608	2 $\frac{3}{4}$
18	49870	2 $\frac{3}{4}$
20	89621	2 $\frac{3}{4}$
22	89630	2 $\frac{3}{4}$
24	89637	2 $\frac{3}{4}$

WH38—3 PITCH—5 IN. FACE

14	49845	2 $\frac{1}{2}$
15	89602	2 $\frac{1}{2}$
16	49833	2 $\frac{1}{2}$
17	89609	2 $\frac{1}{2}$
18	89612	2 $\frac{1}{2}$
19	89617	2 $\frac{1}{2}$
20	89622	2 $\frac{1}{2}$
22	89631	2 $\frac{1}{2}$
24	89638	2 $\frac{1}{2}$
26	89644	2 $\frac{1}{2}$
28	89648	2 $\frac{1}{2}$
30	89651	2 $\frac{1}{2}$
32	89654	2 $\frac{1}{2}$
34	89656	2 $\frac{1}{2}$

WH49—Same as WH12

WH50—2 1/2 PITCH—5 IN. FACE

15	89600	3 $\frac{1}{2}$
17	89660	3 $\frac{7}{8}$
17	89659	4
19	89620	3 $\frac{7}{8}$
20	89626	3 $\frac{7}{8}$
21	89629	3 $\frac{7}{8}$

WH56—Same as WH38

WH68—Same as WH38

WH85—2 1/2 PITCH—5 IN. FACE

27	49880	3 $\frac{1}{2}$
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WH92—3 PITCH—5 IN. FACE

No. of Teeth	Cat. No.	Bore
15	89603	2 $\frac{3}{4}$
16	89606	2 $\frac{3}{4}$
18	89613	2 $\frac{3}{4}$
20	89623	2 $\frac{3}{4}$
22	89632	2 $\frac{3}{4}$
24	89639	2 $\frac{3}{4}$
26	89645	2 $\frac{3}{4}$

WH93—3 PITCH—5 IN. FACE

16	89607	3 $\frac{3}{4}$
17	89610	3 $\frac{3}{4}$
18	89614	3 $\frac{3}{4}$
19	89618	3 $\frac{3}{4}$
20	89624	3 $\frac{3}{4}$
21	89628	3 $\frac{3}{4}$
22	89633	3 $\frac{3}{4}$
23	89635	3 $\frac{3}{4}$
24	89640	3 $\frac{3}{4}$
25	89643	3 $\frac{3}{4}$
26	49871	3 $\frac{3}{4}$
27	89647	3 $\frac{3}{4}$
28	89649	3 $\frac{3}{4}$
29	89650	3 $\frac{3}{4}$
30	89652	3 $\frac{3}{4}$
31	89653	3 $\frac{3}{4}$
32	89655	3 $\frac{3}{4}$
35	89657	3 $\frac{3}{4}$

WH101—3 PITCH—5 IN. FACE

15	89604	3
16	49850	3
17	89611	3
18	89615	3
19	89619	3
20	89625	3
22	89634	3
23	89636	3
24	89641	3
26	89646	3

WH112—Same as WH93

WH113—2 1/2 PITCH—5 1/4 IN FACE

18	89616	4 $\frac{3}{4}$
20	89627	4 $\frac{3}{4}$
24	89642	4 $\frac{3}{4}$

WH121—2 1/2 PITCH—5 IN. FACE

16	89661	3 $\frac{3}{4}$
24	49882	3 $\frac{3}{4}$

RAILWAY MOTOR GEAR CASES



GE80 Gear Case

The standard railway motor gear cases are malleable iron castings with supporting brackets cast together with one or both halves. Owing to the thin section of the cases and the relatively heavy section of the supporting brackets the production of castings for these cases is a difficult matter and requires a high degree of perfection of foundry practice. The greatest care is exercised in the inspection of all castings in order to insure freedom from shrinkage cracks in the supporting brackets, and distortion of shells.

In the following table the various cases are designated by catalogue numbers and also by symbol or drawing list numbers. All gear cases have stamped upon them either a symbol number as (DE6) or a drawing list number as (DL-37902), and any gear case may be readily identified by reference to the catalogue number corresponding to the symbol or drawing list number stamped on it.

The table also gives the maximum gear teeth and maximum pinion teeth which the case will accommodate and the finished hub diameter of the gear with which it may be used.

Motor	Form	Cat. No.	DE or DL No.	Max. Gear Teeth	Max. Pinion Teeth	Pitch	Fin. Hub Diam. of Gear
NWP2½	A	100090	DE104	58	20	4	4½
CB14	A, H & T	51985	DE73	66	14	4	4½
CB15	T	51985	DE73	66	14	4	4½
WP30	}	16514	—	67	17	3	5
WP30							
*GE800 & CO2005	B	17459	DE41	67	18	3	5
GE800 & CO2005	B	17140	DE44	67	18	3	6
GE1000	A	55869	DE13	62	24	3	6
GE1000	A	21693	DE120	62	24	3	6½
GE1000	A	14795	DE6	67	20	3	6
GE1000	A	21687	DE119	67	20	3	6½
GE1000	A	21690	DE121	70	18	3	6½
*GE1200	B	18017	DE57	62	22	3	6
GE51 & CO2001	B	38622	DE39	69	22	3	6½
GE51 & CO2001	B	38624	DE63	69	22	3	8
GE52 & CO2002	A	17986	DE19	67	20	3	6
GE52 & CO2002	B & H	29178	DE140	67	20	3	6
GE52 & CO2002		24997	DE149	67	20	3	6½
GE53	A	52586	DE36	67	22	3	6
GE53	A	52585	DE35	69	17	3	6
GE54	A	17986	DE19	67	20	3	6
GE54	B & H	29178	DE140	67	20	3	6
GE54		24997	DE149	67	20	3	6½
*GE55 & CO2003	A, B, D & F	38632	DE191	56	20	2½	8
GE57 & CO2007	A	38614	DE3	61	33	3	6½
GE57 & CO2007	A	50249	DE1	69	23	3	6½
GE57 & CO2007	H	38623	DE52	65	28	3	8
GE57 & CO2007	H	39529	DE180	69	21	3	8
GE57 & CO2007	H	38631	DE176	71	21	3	8
GE58 & CO2004	A	50440	DE2	69	19	3	6
GE58 & CO2004	C	38618	DE15	69	19	3	6
GE59	A	49558	DE62	69	22	3	6
GE60	A	52376	DE8	67	21	3	6
*GE61	A & B	39381	DE23	81	23	3	6
GE66		24856	DE114	72	23	3	8½
GE66	A	49568	DE179	61	38	3	13
*GE66	A	24854	DE107	71	23	3	13
GE66	B	24860	DE125	76	29	3	9½
GE66	B	24858	DE116	66	38	3	9½
GE66	C	47390	DL37941	62	24	2½	14
GE67	A	55869	DE13	62	24	3	6
GE67	A	21693	DE120	62	24	3	6½
GE67	A	14795	DE6	67	20	3	6
GE67	A	21687	DE119	67	20	3	6½
GE67	A	55868	DE14	70	18	3	6
GE67	A	21690	DE121	70	18	3	6½

* With dust guard

RAILWAY MOTOR GEAR CASES

Motor	Form	Cat. No.	DE or DL No.	Max. Gear Teeth	Max. Pinion Teeth	Pitch	Fin. Hub Diam. of Gear
GE69	A & B	39535	DL37902	64	22	2½	10½
GE69	A & B	49580	DE161	63	22	2½	13
GE69	C	43414	DL37931	60	33	2½	14
GE70	A	35773	DL37908	71	23	3	8
GE70	D	48721	DL37906	71	23	3	8
GE73	C	32397	DE166	59	31	2½	8½
GE73	C	32396	DE165	72	39	3	8½
GE73	C	46624	DL37940	59	19	2½	8½
GE73	E	24850	DE111	73	22	3	8½
GE73	E	24856	DE114	59	31	2½	13
GE74	A	39534	DE222	72	39	3	13
GE74	A	35192	DL37901	61	38	3	8½
GE77	A	39528	DE177	72	23	3	8½
GE78	A	42971	DL37910	69	28	3	8½
GE79	A	43391	DL37912	73	26	3	8½
GE80	A	39536	DL37909	67	25	3	6
GE80	B	45480	DL37945	69	27	3	6½
GE80	C	45482	DL37938	71	22	3	6
GE81	A	42972	DL37939	71	23	3	8
GE81	A	46594	DL37968	67	21	3	6
GE87	A	42973	DL37927	67	21	3	6½
GE87	B	42975	DL37946	71	28	3	8
GE87	B	42975	DL37946	67	28	3	8
GE88	A & C	65139	DL37997	71	23	3	9
GE88	B & D	65141	DL37999	71	23	3	9
GE90	A	39536	DL37909	71	23	3	8
GE90	B	45480	DL37945	71	27	3	8
GE96	B	49606	DL37959	66	20	4	5½
GE97	B	49608	DL37969	72	22	3	8
GE202	A	49609	DL37956	71	23	3	8
GE204	A	49610	DL37960	60	26	2½	9
GE205	A & B	48722	DL37954	58	24	2½	8½
GE205	B	69098	DL96147	50	30	2½	8½
GE207	A	49612	DL37957	64	22	2½	12 & 13
GE207	A	65295	DL95115	64	22	2½	10½
GE207	A	66085	DL95160	58	31	2½	10½
GE207	A	100998	DL37984	64	22	2½	13½
GE210	A & B	58138	DL37972	69	24	3	8
GE210	D	69097	DL96146	62	30	3	10
GE210	C	66617	DL95184	71	24	3	10
GE213	A	58136	DL37979	71	23	3	8
GE216	A	60503	DL37993	71	23	3	9
GE216	C	58136	DL37979	71	23	3	8
GE217	A	58138	DL37972	69	24	3	8
GE218	A	65142	DL89181	71	23	3	9
GE219	A & B	65141	DL37999	71	23	3	9

RAILWAY BABBITT METAL

The General Electric Standard Railway Babbitt Metal is a tin base babbitt having a specific gravity of 7.27, which should be taken into account in comparing its price with that of lead base or other heavier babbitts which, although costing less per pound, are, by reason of their higher specific gravity, actually no cheaper. Its virtue lies not only in the proportions of its ingredients but in the method of mixing, handling, etc., employed, and it cannot be duplicated by other manufacturers by merely using the proportions shown by its analysis.

For the best results the shells and mandrels should be heated to about 100° Centigrade before the metal is poured, and the metal should be well peened into the shell before being bored out. In the case of solid linings a tapered arbor slightly larger than the unfinished bore should be forced through in order to thoroughly seat the babbitt metal in the shell.

Price for Railway Babbitt Metal quoted on application.

AIR COMPRESSOR MOTORS COMPLETE ARMATURES



Compressor	Cat. No.	No. of Arm. Turns	Volts
CP-21B	59878	3	125
CP-21A&B	59877	6	250
CP-21A&B	59876	9	550
CP-22B&C	59881	3	125
CP-22B&C	59880	4	250
CP-22B&C	59879	8	550
CP-23B	100146	3	250
CP-23B	100147	5	550
CP-26A	100193	3	600
CP-27A	100223	11	600
CP-28A	100234	8	600
CP-29A	100243	9	1200

COMPLETE COMMUTATORS



Compressor	Cat. No.	No. of Arm. Turns	Volts	No. of Segments
CP-21B	46913	3	125	77
CP-21A&B	44496	6	250	77
CP-21A&B	44495	9	550	117
CP-22B&C	44875	3	125	73
CP-22B&C	44874	4	250	117
CP-22B&C	44873	8	550	117
CP-23B	100150	3	250	99
CP-23B	100151	5	550	123
CP-26A	100195	3	600	165
CP-27A	100225	11	600	135
CP-28A	100236	8	600	135
CP-29A	100245	9	1200	205

AIR COMPRESSOR MOTORS COMMUTATOR SEGMENTS



Compressor	Volts	Cat. No.	No. of Arm. Turns	No. of Segments
CP-21B	125	46914	3	77
CP-21A&B	250	44504	6	77
CP-21A&B	550	44503	9	117
CP-22B&C	125	44882	3	73
CP-22B&C	250	44881	4	117
CP-22B&C	550	44880	8	117
CP-23B	250	100152	3	99
CP-23B	550	100153	5	123
CP-26A	600	100196	3	165
CP-27A	600	100226	11	135
CP-28A	600	100237	8	135
CP-29A	1200	100246	9	205

ARMATURE COILS



Compressor	Volts	Cat. No.	No. of Arm. Turns	Conductor	Coils in Set
CP-21B	125	46912	3	No. 16 B.&S.	39
CP-21A&B	250	44494	6	No. 16 B.&S.	39
CP-21A&B	550	44493	9	No. 20 B.&S.	39
CP-22B&C	125	44872	3	No. 11 B.&S.	37
CP-22B&C	250	44871	4	No. 18 B.&S.	39
CP-22B&C	550	44870	8	No. 18 B.&S.	39
CP-23B	250	100148	3	(2) .068" T.C.C.	33
CP-23B	550	100149	5	No. 14 B.&S.	41
CP-26A	600	100194	3	.102" E.D.C.C.	33
CP-27A	600	100224	11	.035" D.C.C.	45
CP-28A	600	100235	8	.045" D.C.C.	45
CP-29A	1200	100244	9	.038" T.C.C.	41

AIR COMPRESSOR MOTORS FIELD COILS



Compressor	Volts	No. of Arm. Turns	Cat. No.	Turns	Conductor
CP-21B	125	3	46903	135	No. 10 B.W.G.
CP-21A&B	250	6	44460	250	No. 13 B.G.W.
CP-21A&B	550	9	44459	540	No. 14 B.&S.
CP-22B&C	125	3	44595	105	No. 8 B.W.G.
CP-22B&C	250	4	44594	260	No. 12 B.W.G.
CP-22B&C	550	8	44593	610	.076" x .086"
CP-23B	250	3	100139	140	.172" T.C.C.
CP-23B	550	5	100140	340	No. 12 B.W.G.
CP-26A	600	3	*100189 §100190	157	.172" T.C.C.
CP-27A	600	11	Δ100219 †100220	365	.061" D.C.C.
CP-28A	600	8	Δ100230 †100231	300	.076" D.C.C.
CP-29A	1200	9	Δ100240 †100241	565	.064" D.C.C.

* Side coil.

§ Top and bottom coils.

Δ Top field coil, crank end and bottom field coil, cyl. end.

† Top field coil, cyl. end and bottom field coil, crank end.

BRUSH-HOLDERS



Cat. No. 44840

Compressor	Volts	CAT. NO.			
		Support Complete with Brush-Holder		Brush-Holder Complete	
		Top	Bottom	Top	Bottom
CP-21B	125	46904	46905	46906	46907
CP-21A&B	250	44466	44468	44474	44476
CP-21A&B	550	44465	44467	44473	44475
CP-22B&C	125	44599	44841	44846	44848
CP-22B&C	250	44598	44840	44845	44847
	550				
CP-23B	250	100141	100143	100258	100260
CP-23B	550	100142	100144	100259	100261
CP-26A	600	100191	100191	100262	100262
CP-27A	600	100221	100221	100263	100263
CP-28A	600	100232	100232	100264	100264
CP-29A	1200	100242	100242	100265	100265

AIR COMPRESSOR MOTORS

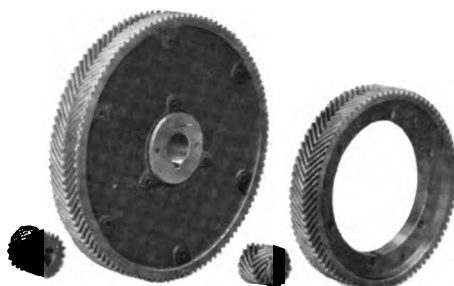
ARMATURE LININGS

Compressor	Location of Lining	Cat. No.	Bore	Diam. of Flange	Outside Diam. of Shell	Radius	Length
CP-21A	Com. End	44453	$1\frac{3}{16}$	$2\frac{9}{16}$	$11\frac{1}{8}$	$\frac{1}{16}$	$3\frac{1}{2}$
CP-21A	Pin. End	44452	$1\frac{1}{16}$	$2\frac{1}{8}$	$11\frac{1}{8}$	$\frac{1}{16}$	$4\frac{1}{2}$
CP-21B	Com. End	40152	$1\frac{1}{16}$	$2\frac{9}{16}$	$11\frac{1}{8}$	$\frac{1}{16}$	$3\frac{1}{2}$
CP-21B	Pin. End	44452	$1\frac{1}{16}$	$2\frac{1}{8}$	$11\frac{1}{8}$	$\frac{1}{16}$	$4\frac{1}{2}$
CP-22B	Com. End	44587	$1\frac{1}{16}$	$2\frac{1}{8}$	$11\frac{1}{8}$	$\frac{1}{16}$	$4\frac{1}{2}$
CP-22B	Pin. End	44586	$1\frac{5}{16}$	3	$2\frac{3}{8}$	$\frac{1}{8}$	$4\frac{1}{2}$
CP-22C	Com. End	46916	$1\frac{1}{16}$	$2\frac{1}{4}$	$11\frac{1}{8}$	$\frac{1}{16}$	$3\frac{1}{2}$
CP-22C	Pin. End	44586	$1\frac{5}{16}$	3	$2\frac{3}{8}$	$\frac{1}{8}$	$4\frac{1}{2}$
CP-23B	Com. End	100138	$1\frac{3}{4}$	†	$2\frac{1}{4}$	$\frac{1}{16}$	$5\frac{1}{2}$
CP-23B	Pin. End	100137	2	†	$2\frac{1}{2}$	$\frac{1}{16}$	6
CP-26A	Pin. End	100188	$2\frac{1}{2}$	†	3	$\frac{1}{16}$	$6\frac{1}{8}$
CP-27A		*100218	$1\frac{3}{8}$	†	$2\frac{3}{16}$		5
CP-28A		*100229	$1\frac{1}{8}$	†	$2\frac{1}{16}$		6
CP-29A		*100229	$1\frac{7}{8}$	†	$2\frac{1}{16}$		6

* Overhung shaft—armature end and pinion end bearing are interchangeable.

† Has no flange.

GEARS AND PINIONS



GEARS

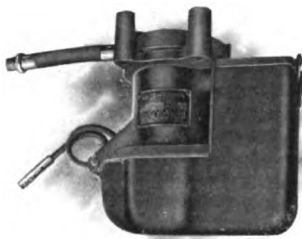
Compressor	Cat. No.	Teeth	DIMENSIONS IN INCHES		
			Pitch	Bore	Face
CP-21A&B	44569	119	9	$1\frac{5}{8}$	$1\frac{1}{2}$
CP-22B&C	44945	109	7	$2\frac{1}{8}$	$2\frac{1}{2}$
CP-23B	100155	78	4	$2\frac{1}{2}$	$2\frac{1}{2}$
CP-26A	100198	66	4	11	$3\frac{1}{4}$
CP-27A	100228	82	7.071	8	$2\frac{1}{4}$
CP-28A	100239	82	6.010	9.125	$2\frac{3}{8}$
CP-29A	100239	82	6.010	9.125	$2\frac{3}{8}$

PINIONS

CP-21A&B	44509	17	9	$1\frac{1}{16}$	$1\frac{1}{2}$
CP-22B&C	44888	17	7	$1\frac{1}{4}$	$2\frac{1}{2}$
CP-23B	100154	13	4	$1\frac{3}{8}$	$2\frac{1}{4}$
CP-26A	100197	16	4	$2\frac{1}{4}$	$3\frac{1}{4}$
CP-27A	100227	15	7.071	$1\frac{1}{8}$	$2\frac{1}{4}$
CP-28A	100238	15	6.010	$1\frac{1}{16}$	$2\frac{3}{8}$
CP-29A	100238	15	6.010	$1\frac{1}{16}$	$2\frac{3}{8}$

AIR BRAKE APPARATUS

AIR COMPRESSOR GOVERNOR



The independent motor-driven air compressors now so extensively used in connection with both the brake system of the modern electric car and stationary plants require, for successful operation, an automatic governor. The function of this governor is to stop the compressor motor when the desired maximum air pressure has been obtained and to start it whenever this pressure falls below a predetermined minimum. The reliability of the governor is the most important factor in securing continuity of service and a ready and positive control of the car by the brake system. With these conditions clearly in view the General Electric Company has brought out the Type MC governor, the details of which are the result of long experience with apparatus of this class. The governor is light and compact and is simple in operation.

Cat. No.	Description	Weight in Lb.
38557	Type MC65—100—10 Form B	30

SAFETY VALVE

The safety valve should be connected to the reservoir line in a convenient location. Its function is to prevent too high a pressure accumulating in the reservoir due to the failure of the governor. The valve is similar to the pop safety valve used in steam practice. It can be readily adjusted by removing the cap on the upper part of the valve and turning the adjusting screw.

All standard safety valves are adjusted to open at 100 lbs. pressure per square inch.



Cat. No. 38564

38564	$\frac{1}{2}$ " Safety valve	2 $\frac{1}{2}$
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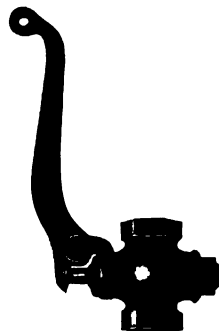
AIR BRAKE APPARATUS

DEEP TONE AIR WHISTLE FOR RAILWAY SERVICE

The air whistle manufactured by the General Electric Co., is the result of a long series of experiments, which were made to definitely determine the best type and dimensions of an air operated whistle to give a clear tone of maximum carrying effect with minimum air consumption. It is substantially constructed of non-corroding metal and should last indefinitely. Its operating efficiency remains constant irrespective of weather conditions.



Cat. No. 37694—Air Whistle



Cat. No. 43524—Operating Valve



Cat. No. 38565—Cut-out Cock

The type of whistle which best meets the requirements of air operation is the organ type, provided it is so designed as to be protected from outside atmospheric disturbances, such as a high head wind. The whistle manufactured by the General Electric Co., is designed with center partitions located so as to prevent a transverse flow of air across the ports, which would tend to distort the effective column of air. This whistle gives a deep, clear, agreeable, penetrating tone, which may be heard at a considerable distance.

Cat. No.	Description	Weight in Lb.
37694	Deep tone air whistle	3½
43524	¾" Whistle operating valve	1
38565	¾" Cut-out cock	1½

AIR BRAKE APPARATUS**MOTORMAN'S VALVES**

The Type S, Form F-4 motorman's valve is used with the straight air brake system.
 The Type A, Form C motorman's valve is used with the automatic air brake system.
 The Type S, Form E motorman's valve is used with emergency straight air brake system.



Cat No 48437



Cat. No. 49316



Cat. No. 59990

Assembled with Handle:

Cat. No.	Description	Weight in Lb.
48437	Motorman's valve, Type S, Form F-4	18
49316	Motorman's valve, Type A, Form C	18
58043	Malleable iron handle for Type S, Form F-4 and Type A, Form C valves	1½
59990	Motorman's valve, Type S, Form E	18
62549	Malleable iron handle for Type S, Form E valve	1½

CUT-OUT COCKS WITH HANDLES

Cat. No. 38567

38565	½" Cut-out cock	1½
38566	¾" Cut-out cock	2¼
38567	1" Cut-out cock	5

AIR BRAKE APPARATUS ANGLE COCKS WITH HANDLES



Cat. No. 38568

Cat. No.	Description	Weight in Lb.
38568	$\frac{1}{2}$ " Angle cock	3
38569	1" Angle cock	5

BRAKE CYLINDERS



Cat. No. 38560



Cat. No. 38562

47349	6" Brake cylinder	119
38560	8" Brake cylinder	156
38561	10" Brake cylinder	198
38562	12" Brake cylinder	279
38563	14" Brake cylinder	370

HOSE COUPLINGS



Cat. No. 38571

38570	$\frac{1}{2}$ " Hose coupling, 22" hose	10
47749	$\frac{1}{2}$ " Hose coupling, 28" hose	12
47750	$\frac{3}{4}$ " Hose coupling, 30" hose	13
38571	1" Hose coupling, 22" hose	11
47751	1" Hose coupling, 28" hose	13
47752	1" Hose coupling, 30" hose	14

AIR BRAKE APPARATUS DUMMY HOSE COUPLING



Cat. No. 38572

Cat. No.	Description	Weight in Lb.
38572	Dummy hose coupling	1

PRESSURE GAUGES, IRON CASE, BRASS RING



Cat. No. 38573



Cat. No. 38574

38573	Pressure gauge, 3½" dial, 120 lbs. maximum pressure	3
38574	Duplex pressure gauge, 5" dial, 120 lbs. maximum pressure	5

MS43-E SWITCH

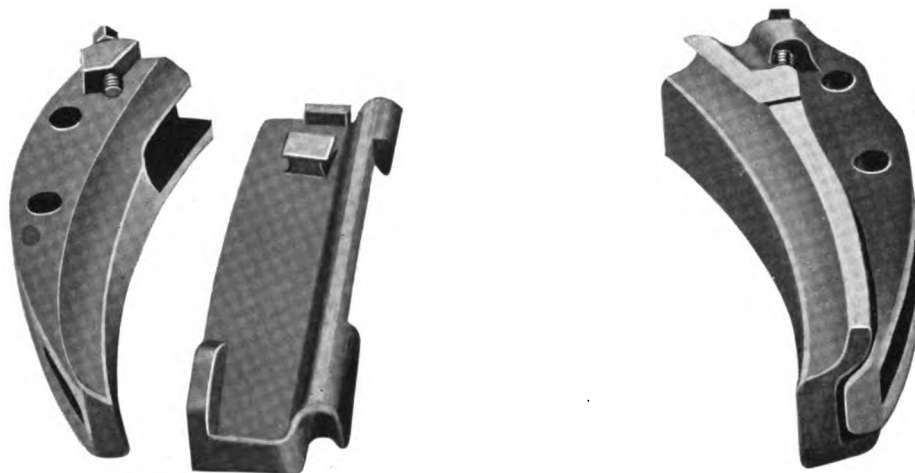


68242	MS43-E Switch, 15 amp., 600 volts, for use with, but does not include enclosed fuses Cat. Nos. 29177 and 26789	3
29177	Enclosed fuse 10 amp., 600 volts	15 per 100
26789	Enclosed fuse 25 amp., 600 volts	15 per 100

REPAIR PARTS FOR MINE LOCOMOTIVES

BRAKE SHOES

The brake shoes used on General Electric mine locomotives are made of cast steel and are of a removable type, fully covered by letters patent. The shoe proper is a separate casting and by loosening a set screw it may be moved around the periphery of the wheel and a new shoe dropped into place. This work is done from above, and a set of brake shoes can be changed in 5 or 10 minutes. Where two sizes of shoe are listed for one type of locomotive, the pattern number which is cast on every shoe, and the locomotive wheel dimensions may be used for purposes of identification.



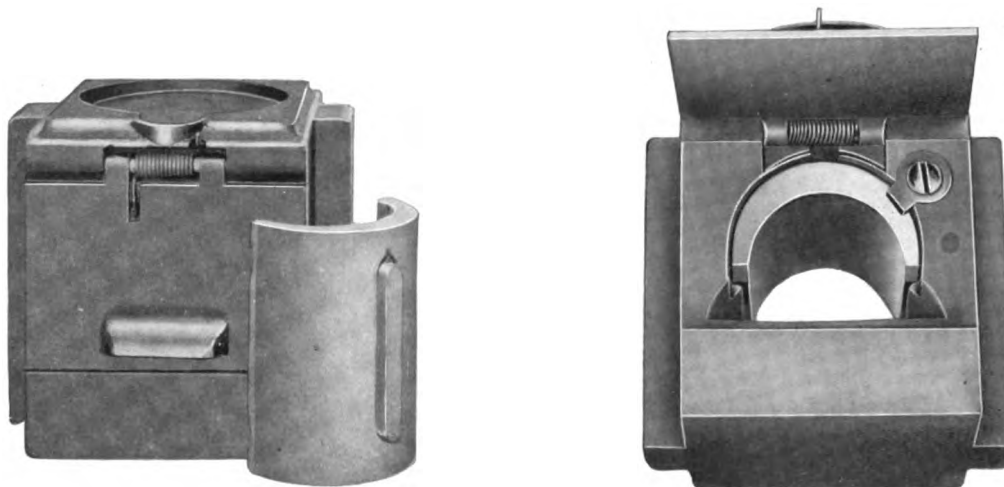
Brake Shoes, Showing the Support and the Shoe Proper

Locomotive	CAT. NOS.		PATTERN NOS.		DIMENSIONS IN INCHES		
	Right-Hand	Left-Hand	Right-Hand	Left-Hand	Diam.	Flange	Tread
LM101 Forms B, C, L & M	65226	65227	111144-M	111144-N	28	1	2 1/4
	65228	65230	120009-C	120009-D	28	1 1/8	2 1/4
LM102 Form A	65239	65240	102689-XB	102689-XC	33	1	3
	65242	65243	228338-A	228338-B	33	1 1/8	3
LM102 Form B	65234	65235	122917-A	122917-B	30	1 1/8	2 1/4
	65236	65238	103972-M	103972-N	30	1	2 1/4
LM103 Forms A, D & K	65186	65200	122460-E	122460-F	22	1 1/8	2 1/4
LM103 Forms E, F, H & L	65206	65222	122973-A	122973-B	22	1 1/8	3 1/4
LM104 Form A	65239	65240	102689-XB	102689-XC	33	1	3
	65242	65243	228338-A	228338-B	33	1 1/8	3
LM104 Form B	65234	65235	122917-A	122917-B	30	1 1/8	2 1/4
	65236	65238	103972-M	103972-N	30	1	2 1/4
LM104 Forms C & D	65226	65227	111144-M	111144-N	28	1	2 1/4
	65228	65230	120009-C	120009-D	28	1 1/8	2 1/4
LM104 Form G	65244	65246	227095-A	227095-B	33	1 1/8	3 1/4
LM105 Form A	65954	65955	34455	34454	20	1 1/8	2 1/4
LM105 Forms B & E	65956	65957	122378-A	122378-B	20	1 1/8	2 1/4
LM105 Form C	65958	65959	120969-A	120969-B	22	1 1/8	2 1/4
LM106 Forms B & C	65226	65227	111144-M	111144-N	28	1	2 1/4
	65228	65230	120009-C	120009-D	28	1 1/8	2 1/4
LM106 Form D	65234	65235	122917-A	122917-B	30	1 1/8	2 1/4
	65236	65238	103972-M	103972-N	30	1	2 1/4
LM109 Form A	65231	65232	122928-G	122928-H	28	1 1/8	3 1/4
LM109 Form B	65226	65227	111144-M	111144-N	28	1	2 1/4
	65228	65230	120009-C	120009-D	28	1 1/8	2 1/4
LM202 Forms B, C & E	65234	65235	122917-A	122917-B	30	1 1/8	2 1/4
	65236	65238	103972-M	103972-N	30	1	2 1/4
LM202 Form D	65242	65243	228338-A	228338-B	33	1 1/8	3

REPAIR PARTS FOR MINE LOCOMOTIVES

JOURNAL BOXES AND LININGS

The journal boxes used on the General Electric Company's mine locomotives are of the regular railway type with removable brass linings, and are lubricated from oil cellars filled with waste. The linings are designed to remain in position if derailment occurs and when worn are easily replaced. Where two forms of journal box are listed for one type of locomotive, the pattern number which is stamped on every box may be used as a means of identification.



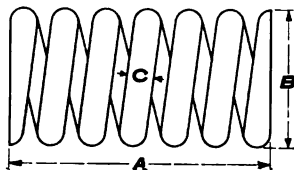
Journal Boxes Used on General Electric Company's Mine Locomotives

Locomotive	Cat. No. Journal Box	Pattern No. Journal Box	Weight in Lb.	Cat. No. Journal Lining	Weight in Lb.
LM101 Forms B, C, L & M	65184	95023-P	66	65202	7
LM101 Form B	65185	18800	49½	65204	5½
LM101 Forms N, R & S	65187	122927-XE	36½	65208	6
LM101 Forms N, R & S	65188	122927-XF	35	65210	5
LM102 Forms A & B	65184	95023-P	66	65202	7
LM103 Forms A, D, K & L	65190	55252	25	65212	3½
LM103 Forms H & L	65192	242153-A	25	65214	4½
LM103 Forms E, F & H	65194	85220-K	17	65216	4
LM104 Form A	65196	242495-A	70½	65218	6
LM104 Forms A, B, C & D	65184	95023-P	66	65202	7
LM104 Forms G & K	65198	225211-D	47½	65220	7
LM105 Forms A, B, C, D & E	65190	55252	25	65212	3½
LM106 Forms B, C, D, E & F	65184	95023-P	66	65202	7
LM109 Forms A	65187	122927-XE	36½	65208	6
LM109 Forms A & B	65188	122927-XF	35	65210	5
LM202 Forms B, C, D & E	65184	95023-P	66	65202	7

REPAIR PARTS FOR MINE LOCOMOTIVES

JOURNAL AND MOTOR SUSPENSION SPRINGS

Journal and motor suspension springs used on General Electric mine locomotives are made of the highest grade of rolled steel. Double coil journal springs consisting of one inside spring and one outside spring are used for the larger locomotives, while in the smaller sizes single coil springs are used. The spring suspension of the motors, which is an important feature of the General Electric mine locomotives, very materially reduces the pounding on the rails and diminishes the expense of maintenance of both track and locomotive. It is consequently of importance that only high-grade springs be used for this purpose.



Locomotive	Descriptive	Cat. No.	DIMENSIONS IN INCHES				No. of Turns
			A	B	C		
LM101 B, C, L & M	Outside Journal Spring	65101	6	5½	1½		4½
LM101 B, C, L & M	Inside Journal Spring	65124	6	3½	1½		8
LM101 N, R & S	Single Journal Spring	65126	6	4½	1½		5
LM102 A & B	Outside Journal Spring	65127	6	5½	1		4
LM102 A & B	Inside Journal Spring	65128	6	3¼	5/8		6½
LM103 A, D, E, F, H, K & L	Single Journal Spring	65129	6½	3½	7/8		5½
LM104 A, B, C, D & G	Outside Journal Spring	65127	6	5½	1		4
LM104 A, B, C, D & G	Inside Journal Spring	65128	6	3¼	5/8		6½
LM104 K	Outside Journal Spring	65223	7½	5½	1		4½
LM104 K	Inside Journal Spring	65224	7½	3¼	5/8		7½
LM105 A, B & E	Single Journal Spring	65135	7½	3½	5/8		7
LM105 C	Single Journal Spring	65130	5½	3½	5/8		6½
LM106 B, C, D, E & F	Outside Journal Spring	65131	6½	5½	7/8		5
LM106 B, C, D, E & F	Inside Journal Spring	65132	7	3½	7/8		8½
LM109 A & B	Single Journal Spring	65126	6	4½	1½		5
LM202 B, C & D	Outside Journal Spring	65127	6	5½	1		4
LM202 B, C & D	Inside Journal Spring	65128	6	3¼	5/8		6½
	*Upper Motor Spring	65133	3½	3½	5/8		2½
	*Lower Motor Spring	65134	3½	3½	1½		2½

* Motor suspension springs Cat. Nos. 65133 and 65134 are used on all standard mine locomotives except types LM103 and LM105.

MISCELLANEOUS DATA

The data indicated below is sufficient to serve as a basis for a definite estimate and quotation on material required for complete catenary line construction. Complete estimates will be furnished promptly upon request accompanied by this information.

CATENARY CONSTRUCTION—DATA SHEET

Customer.....
 Location.....
 Voltage.....
 Height of trolley wire above top of rail.....
 Size of grooved trolley wire.....
 For wheel or sliding collector.....
 Maximum speed of equipments.....
 Poles, whether wood or iron. (If iron, give diameter where bracket is attached).....

Type of Construction	Miles	Distance from Track Center to Pole Center
Single track, side bracket
Single track, cross span
Double track, side bracket (double pole line)
Double track, centre bracket (centre pole line)
Double track, cross span

CURVES

State number and aggregate length of curves of various deflections.

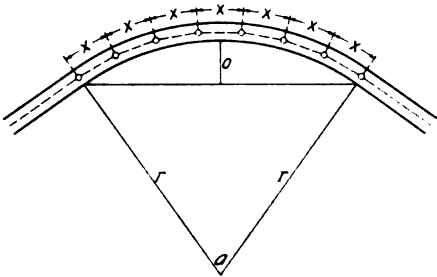
Angles of Deflection	Number of Curves	Aggregate Length in Feet
1° to 2°
2° to 3°
3° to 5°
5° to 7°
7° to 9°
9° to 12°
12° to 18°
18° to 20°
Remarks on special work, i.e., number of turnouts, crossings, frogs, section insulators, etc., required

NOTE.—All catenary line devices are designed for 150 ft. pole spacing on tangents. Pole spacing on curves modified according to degree of curvature.

MISCELLANEOUS DATA

SPACING OF PULL-OFFS ON CURVES

DIRECT SUSPENSION AND CATENARY CONSTRUCTION



The figures given in the table for the middle ordinates, while only approximate, are as nearly accurate as can be readily measured in practice, and are satisfactory for overhead construction work.

Degree of Curvature (a)	Radius of Curve in Feet (r)	Chord in Feet (c)	Middle Ordinate (o) in Inches	Distance in Feet Between Pull-offs (x)
	40	10	3 $\frac{1}{4}$	5
	50	10	3	5 $\frac{1}{2}$
	60	10	2 $\frac{1}{2}$	6
	75	10	2	6 $\frac{1}{2}$
	85	10	1 $\frac{3}{4}$	7
	100	10	1 $\frac{1}{2}$	7 $\frac{1}{2}$
	200	10	$\frac{3}{4}$	10
	300	10	$\frac{1}{2}$	15
14	410	100	36 $\frac{1}{4}$	20
11	521	100	28 $\frac{1}{4}$	24
10	573	100	26 $\frac{1}{4}$	26
9	636	100	23 $\frac{1}{4}$	28
8	716	100	21	31
7	818	100	18 $\frac{1}{2}$	35
6	955	100	15 $\frac{1}{4}$	42
5	1146	100	13	50
4	1432	100	10 $\frac{1}{2}$	60
3	1910	100	7 $\frac{1}{2}$	80
2	2865	100	5 $\frac{1}{2}$	110
1	5730	100	2 $\frac{1}{2}$	150

DIRECT SUSPENSION CONSTRUCTION—OVERHEAD MATERIAL PER MILE

No definite specification of the amount of line material per mile of road can be given, as there are several variable factors, such as pole spacing, number and length of curves, number of turn-outs, etc.

Assuming average conditions, the following list is given and will serve as a basis upon which estimates may be founded.

SPAN WIRE CONSTRUCTION

(Poles 100 ft. apart)

- 44 Straight line suspensions.
- 10 Single curve suspensions.
- 4 Double curve suspensions.
- 50 Plain ears.
- 4 Strain ears.
- 4 Feeder ears.
- 106 Strain insulators, with eye and clevis.
- 25 Strain insulators, with two eyes.
- 125 Eyebolts $\frac{1}{2}$ " x 12" or $\frac{3}{4}$ " x 12".
- 2 Splicing sleeves.
- 1 Section insulator.
- 4 Lightning arresters.
- 1 Frog, right-hand.
- 1 Frog, left-hand.

BRACKET CONSTRUCTION

- 44 Straight line suspensions.
- 10 Single curve suspensions.
- 4 Double curve suspensions.
- 50 Plain ears.
- 4 Strain ears.
- 25 Strain insulators with two eyes.
- 2 Splicing sleeves.
- 1 Section insulators.
- 4 Lightning arresters.
- 1 Frog, right-hand.
- 1 Frog, left-hand.

FEEDERS

The supporting system for the feeder lines will depend upon the number and size of the feeder cables, and upon the pole spacing. Under the conditions assumed above there would be required: 53 sets of cross arms, together with braces, bolts, pins, insulators, etc.

MISCELLANEOUS DATA
CATENARY CONSTRUCTION—MATERIAL PER MILE
TANGENT TRACK—BRACKET CONSTRUCTION
 (For general estimating purposes)

QUANTITY		Line Material	QUANTITY		Line Material
3-Point Const.	11-Point Const.		3-Point Const.	11-Point Const.	
36	36	Brackets	4	4	Anchor clamps
36	36	Insulator pins	2	2	Anchor eyes
36	36	Messenger insulators	12	12	Strain insulators
36		6" hangers	8	8	Anchor turnbuckles
68		14 $\frac{1}{2}$ " hangers	8	8	3-bolt cable clamps
	36	6" hangers	8	8	Eye bolts
	72	6 $\frac{3}{4}$ " hangers	5300	5300	Feet of grooved trolley wire
	72	8 $\frac{1}{2}$ " hangers	5400	5400	Feet of messenger strand
	72	11" hangers	1400	1400	Feet of anchor strand
	72	14 $\frac{1}{2}$ " hangers			Feet of pull-off strand
	72	19 $\frac{1}{2}$ " hangers			Anchor rods
3	3	Splicing sleeves	Dependent on local conditions		Feeder ears
4	4	Anchor ears			

The above list is for tangent track. Curves, crossings, turnouts, etc., require additional material, such as bracket extensions, frogs, crossings, section insulators and extra strain insulators, pull-offs and anchor hangers dependent on local conditions.

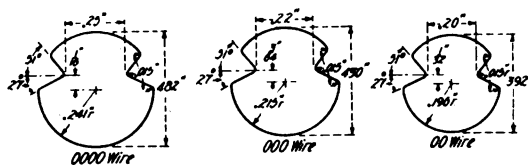
TANGENT TRACK—SPAN CONSTRUCTION
 (For general estimating purposes)

36	36	Span wire messenger hangers	2	2	Anchor clamps
88	88	Strain insulators	4	4	Anchor turnbuckles
36		6" hangers	88	88	3-bolt cable clamps
68		14 $\frac{1}{2}$ " hangers	88	88	Eye bolts
	36	6" hangers	8	8	Anchor rods
	72	6 $\frac{3}{4}$ " hangers	5300	5300	Feet of grooved trolley wire
	72	8 $\frac{1}{2}$ " hangers	5400	5400	Feet of messenger strand
	72	11" hangers	2600	2600	Feet of anchor strand
	72	14 $\frac{1}{2}$ " hangers	3200	3200	Feet of cross span and pole guy strand
	72	19 $\frac{1}{2}$ " hangers			Feet of pull-off strand
3	3	Splicing sleeves	Dependent on local conditions		Feeder ears
4	4	Anchor ears			

If back guys are required elsewhere than at anchor points add extra strain insulators and anchor rods to correspond.

The above list is for tangent track. Curves, crossings, turnouts, etc., require additional material such as frogs, crossings, section insulators and extra strain insulators, pull-offs and anchor hangers dependent on local conditions.

"AMERICAN STANDARD" GROOVED TROLLEY WIRE SECTIONS



The above diagrams show detailed dimensions of the "American Standard" grooved trolley wire sections which have been adopted by, and can be obtained, from the principal manufacturers of trolley wire. These sections are recommended as insuring highest physical characteristics possible in a grooved wire, together with minimum tendency to kink and twist in handling.

The dimensions and location of the grooves afford means of secure attachment of supporting devices which offer no obstruction to the passage of the trolley wheel.

All General Electric grooved wire fittings are accurately adapted to these sections.

MISCELLANEOUS DATA

APPROXIMATE MEASUREMENT OF ANGLES

(TRAUTWINE)

If the inner edges of a common two-foot rule be opened to the extent shown in the column of inches, they will be inclined to each other at the angles shown in the column of angles. Since an opening of $\frac{1}{8}$ in. (up to 19 in. or about 105°) corresponds to about $\frac{1}{2}^\circ$ to 1° , no great accuracy is to be expected, and beyond 105° still less, for the liability to error then increases very rapidly as the opening becomes greater. Thus, the last $\frac{1}{8}$ in. corresponds to about 12° .

Angles for intermediate openings may be calculated to the nearest minute or two, by simple proportion, up to 23 ins. of opening, or about 147° .

TABLE OF ANGLES CORRESPONDING TO OPENINGS OF A TWO-FOOT RULE

Inches	Deg.	Min.	Inches	Deg.	Min.	Inches	Deg.	Min.
$\frac{1}{8}$	1	12	9	44	3	$17\frac{3}{4}$	95	24
$\frac{1}{4}$	2	24	$9\frac{1}{4}$	45	21	18	97	11
$\frac{3}{8}$	3	36	$9\frac{1}{2}$	46	38	$18\frac{1}{4}$	99	0
1	4	47	$9\frac{3}{4}$	47	56	$18\frac{1}{2}$	100	51
$1\frac{1}{4}$	5	58	10	49	15	$18\frac{3}{4}$	102	45
$1\frac{1}{2}$	7	10	$10\frac{1}{4}$	50	34	19	104	41
$1\frac{3}{4}$	8	22	$10\frac{1}{2}$	51	53	$19\frac{1}{4}$	106	39
2	9	34	$10\frac{3}{4}$	53	13	$19\frac{1}{2}$	108	41
$2\frac{1}{4}$	10	46	11	54	34	$19\frac{3}{4}$	110	46
$2\frac{1}{2}$	11	58	$11\frac{1}{4}$	55	55	20	112	53
$2\frac{3}{4}$	13	10	$11\frac{1}{2}$	57	16	$20\frac{1}{4}$	115	5
3	14	22	$11\frac{3}{4}$	58	38	$20\frac{1}{2}$	117	20
$3\frac{1}{4}$	15	34	12	60	0	$20\frac{3}{4}$	119	40
$3\frac{1}{2}$	16	46	$12\frac{1}{4}$	61	23	21	122	6
$3\frac{3}{4}$	17	59	$12\frac{1}{2}$	62	47	$21\frac{1}{4}$	124	36
4	19	12	$12\frac{3}{4}$	64	11	$21\frac{1}{2}$	127	14
$4\frac{1}{4}$	20	24	13	65	35	$21\frac{3}{4}$	129	59
$4\frac{1}{2}$	21	37	$13\frac{1}{4}$	67	1	22	132	53
$4\frac{3}{4}$	22	50	$13\frac{1}{2}$	68	28	$22\frac{1}{4}$	135	58
5	24	3	$13\frac{3}{4}$	69	55	$22\frac{1}{2}$	139	16
$5\frac{1}{4}$	25	16	14	71	22	$22\frac{3}{4}$	142	51
$5\frac{1}{2}$	26	30	$14\frac{1}{4}$	72	51	23	146	48
$5\frac{3}{4}$	27	44	$14\frac{1}{2}$	74	21	$23\frac{1}{4}$	151	17
6	28	58	$14\frac{3}{4}$	75	51	$23\frac{1}{2}$	156	34
$6\frac{1}{4}$	30	11	15	77	22	$23\frac{3}{4}$	163	27
$6\frac{1}{2}$	31	26	$15\frac{1}{4}$	78	54	24	180	0
$6\frac{3}{4}$	32	40	$15\frac{1}{2}$	80	27			
7	33	54	$15\frac{3}{4}$	82	2			
$7\frac{1}{4}$	35	10	16	83	37			
$7\frac{1}{2}$	36	25	$16\frac{1}{4}$	85	14			
$7\frac{3}{4}$	37	41	$16\frac{1}{2}$	86	52			
8	38	57	$16\frac{3}{4}$	88	31			
$8\frac{1}{4}$	40	13	17	90	12			
$8\frac{1}{2}$	41	29	$17\frac{1}{4}$	91	54			
$8\frac{3}{4}$	42	46	$17\frac{1}{2}$	93	38			

DECIMAL EQUIVALENTS

OF EIGHTHS, SIXTEENTHS, THIRTY-SECONDS AND SIXTY-FOURTHS

Fractions	Decimals	Fractions	Decimals	Fractions	Decimals	Fractions	Decimals
$\frac{1}{64}$	=.015625	$\frac{11}{64}$	=.265625	$\frac{33}{64}$	=.515625	$\frac{49}{64}$	=.765625
$\frac{2}{64}$	=.03125	$\frac{12}{64}$	=.28125	$\frac{34}{64}$	=.53125	$\frac{50}{64}$	=.78125
$\frac{3}{64}$	=.046875	$\frac{13}{64}$	=.296875	$\frac{35}{64}$	=.546875	$\frac{51}{64}$	=.796875
$\frac{4}{64}$	=.0625	$\frac{14}{64}$	=.3125	$\frac{36}{64}$	=.5625	$\frac{52}{64}$	=.8125
$\frac{5}{64}$	=.078125	$\frac{15}{64}$	=.328125	$\frac{37}{64}$	=.578125	$\frac{53}{64}$	=.828125
$\frac{6}{64}$	=.09375	$\frac{16}{64}$	=.34375	$\frac{38}{64}$	=.59375	$\frac{54}{64}$	=.84375
$\frac{7}{64}$	=.109375	$\frac{17}{64}$	=.359375	$\frac{39}{64}$	=.609375	$\frac{55}{64}$	=.859375
$\frac{8}{64}$	=.125	$\frac{18}{64}$	=.375	$\frac{40}{64}$	=.625	$\frac{56}{64}$	=.875
$\frac{9}{64}$	=.140625	$\frac{19}{64}$	=.390625	$\frac{41}{64}$	=.640625	$\frac{57}{64}$	=.890625
$\frac{10}{64}$	=.15625	$\frac{20}{64}$	=.40625	$\frac{42}{64}$	=.65625	$\frac{58}{64}$	=.90625
$\frac{11}{64}$	=.171875	$\frac{21}{64}$	=.421875	$\frac{43}{64}$	=.671875	$\frac{59}{64}$	=.921875
$\frac{12}{64}$	=.1875	$\frac{22}{64}$	=.4375	$\frac{44}{64}$	=.6875	$\frac{60}{64}$	=.9375
$\frac{13}{64}$	=.203125	$\frac{23}{64}$	=.453125	$\frac{45}{64}$	=.703125	$\frac{61}{64}$	=.953125
$\frac{14}{64}$	=.21875	$\frac{24}{64}$	=.46875	$\frac{46}{64}$	=.71875	$\frac{62}{64}$	=.96875
$\frac{15}{64}$	=.234375	$\frac{25}{64}$	=.484375	$\frac{47}{64}$	=.734375	$\frac{63}{64}$	=.984375
$\frac{16}{64}$	=.25	$\frac{26}{64}$	=.5	$\frac{48}{64}$	=.75		

MISCELLANEOUS DATA

TABLE OF CIRCLES—1

(TRAUTWINE)

DIAMETER IN UNITS AND EIGHTHS, ETC.

Diameter	Circumference	Area	Diameter	Circumference	Area
$\frac{1}{16}$	.049087	.00019	$2\frac{1}{8}$	9.22843	6.7771
$\frac{1}{8}$	.098175	.00077	3	9.42478	7.0686
$\frac{3}{16}$	.147262	.00173	$3\frac{1}{8}$	9.62113	7.3662
$\frac{1}{4}$	.196350	.00307	$3\frac{1}{4}$	9.81748	7.6699
$\frac{5}{16}$	.245424	.00690	$3\frac{3}{8}$	10.0138	7.9798
$\frac{3}{8}$	.294524	.01227	$3\frac{1}{2}$	10.2102	8.2958
$\frac{7}{16}$	.343624	.01917	$3\frac{5}{8}$	10.4065	8.6179
$\frac{1}{2}$	.392699	.02761	$3\frac{3}{4}$	10.6029	8.9462
$\frac{9}{16}$	.441774	.03758	$3\frac{7}{8}$	10.7992	9.2806
$\frac{5}{8}$	.490874	.04909	4	10.9956	9.6211
$\frac{11}{16}$	.539974	.06213	$4\frac{1}{8}$	11.1919	9.9678
$\frac{3}{4}$	.589049	.07670	$4\frac{1}{4}$	11.3883	10.321
$\frac{13}{16}$	.638124	.09281	$4\frac{3}{8}$	11.5846	10.680
$\frac{7}{8}$	.687223	.11045	$4\frac{1}{2}$	11.7810	11.045
1	.736323	.12962	$4\frac{5}{8}$	11.9773	11.416
$1\frac{1}{16}$	.785398	.15033	$4\frac{3}{4}$	12.1737	11.793
$1\frac{1}{8}$	.834473	.17257	$4\frac{7}{8}$	12.3700	12.177
$1\frac{3}{16}$	.883573	.19635	5	12.5664	12.566
$1\frac{1}{4}$	.932673	.22166	$5\frac{1}{8}$	12.7627	12.962
$1\frac{3}{8}$	.981773	.24850	$5\frac{1}{4}$	12.9591	13.364
$1\frac{5}{8}$	1.030873	.27688	$5\frac{3}{8}$	13.1554	13.772
$1\frac{3}{4}$	1.079973	.30680	$5\frac{1}{2}$	13.3518	14.186
$1\frac{7}{8}$	1.129073	.33824	$5\frac{5}{8}$	13.5481	14.607
2	1.178173	.37122	$5\frac{3}{4}$	13.7445	15.033
$2\frac{1}{16}$	1.227273	.40574	$5\frac{7}{8}$	13.9408	15.466
$2\frac{1}{8}$	1.276373	.44179	6	14.1372	15.904
$2\frac{3}{16}$	1.325473	.47937	$6\frac{1}{8}$	14.3335	16.349
$2\frac{1}{4}$	1.374573	.51849	$6\frac{1}{4}$	14.5299	16.800
$2\frac{5}{16}$	1.423673	.55914	$6\frac{3}{8}$	14.7262	17.257
$2\frac{3}{8}$	1.472773	.60132	$6\frac{1}{2}$	14.9226	17.721
$2\frac{7}{16}$	1.521873	.64504	$6\frac{5}{8}$	15.1189	18.190
$2\frac{1}{2}$	1.570973	.69029	$6\frac{3}{4}$	15.3153	18.665
$2\frac{9}{16}$	1.620073	.73708	$6\frac{7}{8}$	15.5116	19.147
$2\frac{5}{8}$	1.669173	.78540	7	15.7080	19.635
$2\frac{3}{4}$	1.718273	.83447	$7\frac{1}{8}$	15.9043	20.129
$2\frac{7}{8}$	1.767373	.88357	$7\frac{1}{4}$	16.1007	20.629
3	1.816473	.93267	$7\frac{3}{8}$	16.2970	21.135
$3\frac{1}{16}$	1.865573	1.075	$7\frac{1}{2}$	16.4934	21.648
$3\frac{1}{8}$	1.914673	1.2272	$7\frac{5}{8}$	16.6897	22.166
$3\frac{3}{16}$	1.963773	1.3530	$7\frac{3}{4}$	16.8861	22.691
$3\frac{1}{4}$	2.012873	1.4849	$7\frac{7}{8}$	17.0824	23.221
$3\frac{5}{16}$	2.061973	1.6230	8	17.2788	23.758
$3\frac{3}{8}$	2.111073	1.7671	$8\frac{1}{8}$	17.4751	24.301
$3\frac{1}{2}$	2.160173	1.9175	$8\frac{1}{4}$	17.6715	24.850
$3\frac{5}{8}$	2.209273	2.0739	$8\frac{3}{8}$	17.8678	25.406
$3\frac{3}{4}$	2.258373	2.2365	$8\frac{5}{8}$	18.0642	25.967
$3\frac{7}{8}$	2.307473	2.4053	$8\frac{3}{4}$	18.2605	26.535
4	2.356573	2.5802	$8\frac{7}{8}$	18.4569	27.109
$4\frac{1}{16}$	2.405673	2.7612	$8\frac{1}{2}$	18.6532	27.688
$4\frac{1}{8}$	2.454773	2.9483	$8\frac{5}{8}$	18.8496	28.274
$4\frac{3}{16}$	2.503873	3.1416	$8\frac{3}{4}$	19.0459	28.865
$4\frac{1}{4}$	2.552973	3.3410	$8\frac{7}{8}$	19.2423	29.465
$4\frac{5}{16}$	2.602073	3.5466	9	19.4386	30.075
$4\frac{3}{8}$	2.651173	3.7583	$9\frac{1}{8}$	19.6350	30.680
$4\frac{1}{2}$	2.700273	3.9761	$9\frac{1}{4}$	19.8313	31.291
$4\frac{5}{8}$	2.749373	4.2000	$9\frac{3}{8}$	20.0277	31.919
$4\frac{3}{4}$	2.798473	4.4301	$9\frac{5}{8}$	20.2240	32.553
$4\frac{7}{8}$	2.847573	4.6664	$9\frac{3}{4}$	20.4204	33.193
5	2.896673	4.9087	$9\frac{7}{8}$	20.6167	33.842
$5\frac{1}{16}$	2.945773	5.1572	10	20.8131	34.497
$5\frac{1}{8}$	2.994873	5.4119	$10\frac{1}{8}$	21.0094	35.157
$5\frac{3}{16}$	3.043973	5.6727	$10\frac{1}{4}$	21.2058	35.822
$5\frac{1}{4}$	3.093073	5.9396	$10\frac{3}{8}$	21.4021	36.492
$5\frac{5}{16}$	3.142173	6.2126	$10\frac{1}{2}$	21.5984	37.167
$5\frac{3}{8}$	3.191273	6.4918	$10\frac{5}{8}$	21.7947	37.847
$5\frac{1}{2}$	3.240373		$10\frac{3}{4}$	21.9911	38.531
$5\frac{7}{16}$	3.289473		$10\frac{7}{8}$	22.1874	39.220
$5\frac{3}{4}$	3.338573		11	22.3838	39.913
$5\frac{5}{8}$	3.387673		$11\frac{1}{8}$	22.5801	40.611
$5\frac{1}{2}$	3.436773		$11\frac{1}{4}$	22.7765	41.313
$5\frac{9}{16}$	3.485873		$11\frac{3}{8}$	22.9728	42.020
$5\frac{1}{2}$	3.534973		$11\frac{5}{8}$	23.1692	42.731
$5\frac{11}{16}$	3.584073		$11\frac{3}{4}$	23.3655	43.446
$5\frac{3}{4}$	3.633173		$11\frac{7}{8}$	23.5619	44.165
$5\frac{7}{8}$	3.682273		12	23.7582	44.888
$5\frac{5}{8}$	3.731373			23.9546	45.615
$5\frac{11}{16}$	3.780473			24.1509	46.346
$5\frac{3}{4}$	3.829573			24.3473	47.081
$5\frac{9}{16}$	3.878673				
$5\frac{1}{2}$	3.927773				
$5\frac{11}{16}$	3.976873				
$5\frac{3}{4}$	4.025973				
$5\frac{5}{8}$	4.075073				
$5\frac{11}{16}$	4.124173				
$5\frac{3}{4}$	4.173273				
$5\frac{5}{8}$	4.222373				
$5\frac{11}{16}$	4.271473				
$5\frac{3}{4}$	4.320573				
$5\frac{5}{8}$	4.369673				
$5\frac{11}{16}$	4.418773				
$5\frac{3}{4}$	4.467873				
$5\frac{5}{8}$	4.516973				
$5\frac{11}{16}$	4.566073				
$5\frac{3}{4}$	4.615173				
$5\frac{5}{8}$	4.664273				
$5\frac{11}{16}$	4.713373				
$5\frac{3}{4}$	4.762473				
$5\frac{5}{8}$	4.811573				
$5\frac{11}{16}$	4.860673				
$5\frac{3}{4}$	4.909773				
$5\frac{5}{8}$	4.958873				
$5\frac{11}{16}$	5.007973				
$5\frac{3}{4}$	5.057073				
$5\frac{5}{8}$	5.106173				
$5\frac{11}{16}$	5.155273				
$5\frac{3}{4}$	5.204373				
$5\frac{5}{8}$	5.253473				
$5\frac{11}{16}$	5.302573				
$5\frac{3}{4}$	5.351673				
$5\frac{5}{8}$	5.400773				
$5\frac{11}{16}$	5.449873				
$5\frac{3}{4}$	5.498973				
$5\frac{5}{8}$	5.548073				
$5\frac{11}{16}$	5.597173				
$5\frac{3}{4}$	5.646273				
$5\frac{5}{8}$	5.695373				
$5\frac{11}{16}$	5.744473				
$5\frac{3}{4}$	5.793573				
$5\frac{5}{8}$	5.842673				
$5\frac{11}{16}$	5.891773				
$5\frac{3}{4}$	5.940873				
$5\frac{5}{8}$	5.989973				
$5\frac{11}{16}$	6.039073				
$5\frac{3}{4}$	6.088173				
$5\frac{5}{8}$	6.137273				
$5\frac{11}{16}$	6.186373				
$5\frac{3}{4}$	6.235473				
$5\frac{5}{8}$	6.284573				
$5\frac{11}{16}$	6.333673				
$5\frac{3}{4}$	6.382773				
$5\frac{5}{8}$	6.431873				
$5\frac{11}{16}$	6.480973				
$5\frac{3}{4}$	6.530073				
$5\frac{5}{8}$	6.579173				
$5\frac{11}{16}$	6.628273				
$5\frac{3}{4}$	6.677373				
$5\frac{5}{8}$	6.726473				
$5\frac{11}{16}$	6.775573				
$5\frac{3}{4}$	6.824673				
$5\frac{5}{8}$	6.873773				
$5\frac{11}{16}$	6.922873				
$5\frac{3}{4}$	6.971973				
$5\frac{5}{8}$	7.021073				
$5\frac{11}{16}$	7.070173				
$5\frac{3}{4}$	7.119273				
$5\frac{5}{8}$	7.168373				
$5\frac{11}{16}$	7.217473				
$5\frac{3}{4}$	7.266573				
$5\frac{5}{8}$	7.315673				
$5\frac{11}{16}$	7.364773				
$5\frac{3}{4}$	7.413873				
$5\frac{5}{8}$	7.462973				
$5\frac{11}{16}$	7.512073				
$5\frac{3}{4}$	7.561173				
$5\frac{5}{8}$	7.610273				
$5\frac{11}{16}$	7.659373				
$5\frac{3}{4}$	7.708473				
$5\frac{5}{8}$	7.757573				
$5\frac{11}{16}$	7.806673				
$5\frac{3}{4}$	7.855773				
$5\frac{5}{8}$	7.904873				
$5\frac{11}{16}$	7.953973				
$5\frac{3}{4}$	8.003073				
$5\frac{5}{8}$	8.052173				
$5\frac{11}{16}$	8.101273				
$5\frac{3}{4}$	8.150373				
$5\frac{5}{8}$	8.199473				
$5\frac{11}{16}$	8.248573				
$5\frac{3}{4}$	8.297673				
$5\frac{5}{8}$	8.346773				
$5\frac{11}{16}$	8.395873				
$5\frac{3}{4}$	8.444973				
$5\frac{5}{8}$	8.494073				
$5\frac{11}{16}$	8.543173				
$5\frac{3}{4}$	8.592273				
$5\frac{5}{8}$	8.641373				
$5\frac{11}{16}$	8.690473				
$5\frac{3}{4}$	8.739573				
$5\frac{5}{8}$	8.788673				
$5\frac{11}{16}$	8.837773				
$5\frac{3}{4}$	8.886873				
$5\frac{5}{8}$	8.935973				
$5\frac{11}{16}$	8.985073				
$5\frac{3}{4}$	9.034173				
$5\frac{5}{8}$	9.083273				
$5\frac{11}{16}$	9.132373				
$5\frac{3}{4}$	9.181473				
$5\frac{5}{8}$	9.230573				
$5\frac{11}{16}$	9.279673				
$5\frac{3}{4}$	9.328773				
$5\frac{5}{8}$	9.377873				
$5\frac{11}{16}$	9.426973				
$5\frac{3}{4}$	9.476073				
$5\frac{5}{8}$	9.525173		</		

MISCELLANEOUS DATA

TABLE OF CIRCLES—1—(Concluded)

(TRAUTWINE)

DIAMETER IN UNITS AND EIGHTHS, ETC.

Diameter	Circumference	Area	Diameter	Circumference	Area
7 $\frac{1}{8}$	24.7400	48.707	10	31.4159	78.540
8	25.1327	50.265	10 $\frac{1}{8}$	31.8086	80.516
8 $\frac{1}{4}$	25.5254	51.849	11	32.2013	82.516
8 $\frac{3}{8}$	25.9181	53.456	11 $\frac{1}{8}$	32.5940	84.541
9	26.3108	55.088	11 $\frac{1}{4}$	32.9867	86.590
9 $\frac{1}{8}$	26.7035	56.745	11 $\frac{3}{8}$	33.3794	88.664
9 $\frac{1}{4}$	27.0962	58.426	11 $\frac{1}{2}$	33.7721	90.763
9 $\frac{3}{8}$	27.4889	60.132	12	34.1648	92.886
9 $\frac{1}{2}$	27.8816	61.862	12 $\frac{1}{8}$	34.5575	95.033
9 $\frac{5}{8}$	28.2743	63.617	12 $\frac{1}{4}$	34.9502	97.205
9 $\frac{3}{4}$	28.6670	65.397	12 $\frac{3}{8}$	35.3429	99.402
10	29.0597	67.201	12 $\frac{1}{2}$	35.7356	101.62
10 $\frac{1}{8}$	29.4524	69.029	12 $\frac{5}{8}$	36.1283	103.87
10 $\frac{1}{4}$	29.8451	70.882	12 $\frac{3}{4}$	36.5210	106.14
10 $\frac{3}{8}$	30.2378	72.760	12 $\frac{7}{8}$	36.9137	108.43
10 $\frac{1}{2}$	30.6305	74.662		37.3064	110.75
10 $\frac{5}{8}$	31.0232	76.589		37.6991	113.10

TABLE OF CIRCLES—2

(TRAUTWINE)

DIAMETER IN UNITS AND TENTHS, ETC.

0.1	.314159	.007854	3.8	11.93805	11.34115
.2	.628319	.031416	.9	12.25221	11.94591
.3	.942478	.070686	4.0	12.56637	12.56637
.4	1.256637	.125664	.1	12.88053	13.20254
.5	1.570796	.196350	.2	13.19469	13.85442
.6	1.884956	.282743	.3	13.50885	14.52201
.7	2.199115	.384845	.4	13.82301	15.20531
.8	2.513274	.502655	.5	14.13717	15.90431
.9	2.827433	.636173	.6	14.45133	16.61903
1.0	3.141593	.785398	.7	14.76549	17.34945
.1	3.455752	.950332	.8	15.07964	18.09557
.2	3.769911	1.13097	.9	15.39380	18.85741
.3	4.084070	1.32732	5.0	15.70796	19.63495
.4	4.398230	1.53938	.1	16.02212	20.42821
.5	4.712389	1.76715	.2	16.33628	21.23717
.6	5.026548	2.01062	.3	16.65044	22.06183
.7	5.340708	2.26980	.4	16.96460	22.90221
.8	5.654867	2.54469	.5	17.27876	23.75829
.9	5.969026	2.83529	.6	17.59292	24.63009
2.0	6.283185	3.14159	.7	17.90708	25.51759
.1	6.597345	3.46361	.8	18.22124	26.42079
.2	6.911504	3.80133	.9	18.53540	27.33971
.3	7.225663	4.15476	6.0	18.84956	28.27433
.4	7.539822	4.52389	.1	19.16372	29.22467
.5	7.853982	4.90874	.2	19.47787	30.19071
.6	8.168141	5.30929	.3	19.79203	31.17245
.7	8.482300	5.72555	.4	20.10619	32.16991
.8	8.796459	6.15752	.5	20.42035	33.18307
.9	9.110619	6.60520	.6	20.73451	34.21194
3.0	9.424778	7.06858	.7	21.04867	35.25652
.1	9.738937	7.54768	.8	21.36283	36.31681
.2	10.05310	8.04248	.9	21.67699	37.39281
.3	10.36726	8.55299	7.0	21.99115	38.48451
.4	10.68142	9.07920	.1	22.30531	39.59192
.5	10.99557	9.62113	.2	22.61947	40.71504
.6	11.30973	10.17876	.3	22.93363	41.85387
.7	11.62389	10.75210	.4	23.24779	43.00840

MISCELLANEOUS DATA **TABLE OF CIRCLES—2—(Concluded)**

(TRAUTWINE)

DIAMETER IN UNITS AND TENTHS, ETC.

Diameter	Circumference	Area	Diameter	Circumference	Area
7.5	23.56194	44.17865	9.8	30.78761	75.42964
.6	23.87610	45.36460	.9	31.10177	76.97687
.7	24.19026	46.56626	10.0	31.41593	78.53982
.8	24.50442	47.78362	.1	31.73009	80.11847
.9	24.81858	49.01670	.2	32.04425	81.71282
8.0	25.13274	50.26548	.3	32.35840	83.32289
.1	25.44690	51.52997	.4	32.67256	84.94867
.2	25.76106	52.81017	.5	32.98672	86.59015
.3	26.07522	54.10608	.6	33.30088	88.24734
.4	26.38938	55.41769	.7	33.61504	89.92024
.5	26.70354	56.74502	.8	33.92920	91.60884
.6	27.01770	58.08805	.9	34.24336	93.31316
.7	27.33186	59.44679	11.0	34.55752	95.03318
.8	27.64602	60.82123	.1	34.87168	96.76891
.9	27.96017	62.21139	.2	35.18584	98.52035
9.0	28.27433	63.61725	.3	35.50000	100.2875
.1	28.58849	65.03882	.4	35.81416	102.0703
.2	28.90265	66.47610	.5	36.12832	103.8689
.3	29.21681	67.92909	.6	36.44247	105.6832
.4	29.53097	69.39778	.7	36.75663	107.5132
.5	29.84513	70.88218	.8	37.07079	109.3588
.6	30.15929	72.38229	.9	37.38495	111.2202
.7	30.47345	73.89811	12.0	37.69911	113.0973

TABLE OF CIRCLES—3

(TRAUTWINE)

DIAMETER IN FEET AND INCHES

Diameter	Circumference—Feet	Area—Sq. Ft.	Diameter	Circumference—Feet	Area—Sq. Ft.
0' 1"	.261799	.005454	2' 7"	8.11578	5.24144
2"	.523599	.021817	8"	8.37758	5.58505
3"	.785398	.049087	9"	8.63938	5.93957
4"	1.047198	.087266	10"	8.90118	6.30500
5"	1.308997	.136354	11"	9.16298	6.68134
6"	1.570796	.196350	3' 0"	9.42478	7.06858
7"	1.832596	.267254	1"	9.68658	7.46674
8"	2.094395	.349066	2"	9.94838	7.87580
9"	2.356195	.441786	3"	10.21018	8.29577
10"	2.617994	.545415	4"	10.47198	8.72665
11"	2.879793	.659953	5"	10.73377	9.16843
1' 0"	3.14159	.785398	6"	10.99557	9.62113
1"	3.40339	.921752	7"	11.25737	10.08473
2"	3.66519	1.06901	8"	11.51917	10.55924
3"	3.92699	1.22718	9"	11.78097	11.04466
4"	4.18879	1.39626	10"	12.04277	11.54099
5"	4.45059	1.57625	11"	12.30457	12.04823
6"	4.71239	1.76715	4' 0"	12.56637	12.56637
7"	4.97419	1.96895	1"	12.82817	13.09542
8"	5.23599	2.18166	2"	13.08997	13.63538
9"	5.49779	2.40528	3"	13.35177	14.18625
10"	5.75959	2.63981	4"	13.61357	14.74803
11"	6.02139	2.88525	5"	13.87537	15.32072
2' 0"	6.28319	3.14159	6"	14.13717	15.90431
1"	6.54498	3.40885	7"	14.39897	16.49882
2"	6.80678	3.68701	8"	14.66077	17.10423
3"	7.06858	3.97608	9"	14.92257	17.72055
4"	7.33038	4.27606	10"	15.18436	18.34777
5"	7.59218	4.58694	11"	15.44616	18.98591
6"	7.85398	4.90874	5' 0"	15.70796	19.63495

MISCELLANEOUS DATA
TABLE OF CIRCLES—3—(Concluded)
 (TRAUTWINE)

DIAMETER IN FEET AND INCHES

Diameter	Circumference—Feet	Area—Sq. Ft.	Diameter	Circumference—Feet	Area—Sq. Ft.
5' 1"	15.96976	20.29491	8' 7"	26.96534	57.86312
5' 2"	16.23156	20.96577	8' 8"	27.22714	58.99213
5' 3"	16.49336	21.64754	8' 9"	27.48894	60.13205
5' 4"	16.75516	22.34021	8' 10"	27.75074	61.28287
5' 5"	17.01696	23.04380	8' 11"	28.01253	62.44461
5' 6"	17.27876	23.75829	9' 0"	28.27433	63.61725
5' 7"	17.54056	24.48370	9' 1"	28.53613	64.80080
5' 8"	17.80236	25.22001	9' 2"	28.79793	65.99526
5' 9"	18.06416	25.96723	9' 3"	29.05973	67.20063
5' 10"	18.32596	26.72535	9' 4"	29.32153	68.41691
5' 11"	18.58776	27.49439	9' 5"	29.58333	69.64409
6' 0"	18.84956	28.27433	9' 6"	29.84513	70.88218
6' 1"	19.11136	29.06519	9' 7"	30.10693	72.13119
6' 2"	19.37315	29.86695	9' 8"	30.36873	73.39110
6' 3"	19.63495	30.67962	9' 9"	30.63053	74.66191
6' 4"	19.89675	31.50319	9' 10"	30.89233	75.94364
6' 5"	20.15855	32.33768	9' 11"	31.15413	77.23627
6' 6"	20.42035	33.18307	10' 0"	31.41593	78.53982
6' 7"	20.68215	34.03937	10' 1"	31.67773	79.85427
6' 8"	20.94395	34.90659	10' 2"	31.93953	81.17963
6' 9"	21.20575	35.78470	10' 3"	32.20132	82.51589
6' 10"	21.46755	36.67373	10' 4"	32.46312	83.86307
6' 11"	21.72935	37.57367	10' 5"	32.72492	85.22115
7' 0"	21.99115	38.48451	10' 6"	32.98672	86.59015
7' 1"	22.25295	39.40626	10' 7"	33.24852	87.97005
7' 2"	22.51475	40.33892	10' 8"	33.51032	89.36086
7' 3"	22.77655	41.28249	10' 9"	33.77212	90.76258
7' 4"	23.03835	42.23697	10' 10"	34.03392	92.17520
7' 5"	23.30015	43.20235	10' 11"	34.29572	93.59874
7' 6"	23.56194	44.17865	11' 0"	34.55752	95.03318
7' 7"	23.82374	45.16585	11' 1"	34.81932	96.47853
7' 8"	24.08554	46.16396	11' 2"	35.08112	97.93479
7' 9"	24.34734	47.17298	11' 3"	35.34292	99.40196
7' 10"	24.60914	48.19290	11' 4"	35.60472	100.8800
7' 11"	24.87094	49.22374	11' 5"	35.86652	102.3690
8' 0"	25.13274	50.26548	11' 6"	36.12832	103.8689
8' 1"	25.39454	51.31813	11' 7"	36.39011	105.3797
8' 2"	25.65634	52.38169	11' 8"	36.65191	106.9014
8' 3"	25.91814	53.45616	11' 9"	36.91371	108.4340
8' 4"	26.17994	54.54154	11' 10"	37.17551	109.9776
8' 5"	26.44174	55.63782	11' 11"	37.43731	111.5320
8' 6"	26.70354	56.74502	12' 0"	37.69911	113.0973

U. S. STANDARD SCREW THREADS

Diameter Inches	Threads per Inch	Diameter at Root of Thread Inches	Area of Bolt in Sq. Inches	Area of Root of Thread in Sq. Inches
$\frac{1}{16}$	20	.185	.049	.027
$\frac{1}{8}$	18	.240	.077	.045
$\frac{3}{16}$	16	.294	.110	.068
$\frac{1}{4}$	14	.344	.150	.093
$\frac{5}{16}$	13	.400	.196	.126
$\frac{3}{8}$	12	.454	.249	.162
$\frac{7}{16}$	11	.507	.307	.202
$\frac{1}{2}$	10	.620	.442	.302
$\frac{5}{8}$	9	.731	.601	.420
1	8	.837	.785	.550
$1\frac{1}{8}$	7	.940	.994	.694
$1\frac{1}{4}$	7	1.065	1.227	.893
$1\frac{3}{4}$	6	1.160	1.485	1.057
$1\frac{1}{2}$	6	1.284	1.767	1.295

MISCELLANEOUS DATA

U. S. STANDARD SCREW THREADS—(Concluded)

Diameter Inches	Threads per Inch	Diameter at Root of Thread Inches	Area of Bolt in Sq. Inches	Area of Root of Thread in Sq. Inches
1 $\frac{1}{8}$	5 $\frac{1}{2}$	1.389	2.074	1.515
1 $\frac{3}{8}$	5	1.491	2.405	1.746
1 $\frac{7}{8}$	5	1.616	2.761	2.051
2	4 $\frac{1}{2}$	1.712	3.142	2.302
2 $\frac{1}{4}$	4 $\frac{1}{2}$	1.962	3.976	3.023
2 $\frac{3}{4}$	4	2.176	4.909	3.719
2 $\frac{7}{8}$	4	2.426	5.940	4.620
3	3 $\frac{1}{2}$	2.629	7.069	5.428
3 $\frac{1}{4}$	3 $\frac{1}{2}$	2.879	8.296	6.510
3 $\frac{3}{4}$	3 $\frac{1}{2}$	3.100	9.621	7.548
3 $\frac{7}{8}$	3	3.317	11.045	8.641
4	3	3.567	12.566	9.963
4 $\frac{1}{4}$	2 $\frac{7}{8}$	3.798	14.186	11.329
4 $\frac{1}{2}$	2 $\frac{3}{4}$	4.028	15.904	12.753
4 $\frac{3}{4}$	2 $\frac{3}{4}$	4.256	17.721	14.226
5	2 $\frac{1}{2}$	4.480	19.635	15.763
5 $\frac{1}{4}$	2 $\frac{1}{2}$	4.730	21.648	17.572
5 $\frac{3}{4}$	2 $\frac{3}{8}$	4.953	23.758	19.267
5 $\frac{7}{8}$	2 $\frac{3}{8}$	5.203	25.967	21.262
6	2 $\frac{1}{4}$	5.423	28.274	23.098

DIMENSIONS OF STANDARD BOLT HEADS AND NUTS

(Square or Hexagonal)

Let X = diameter across flats of head or nut
Y = thickness of head

Let Z = thickness of nut
D = diameter of bolt

Rough
Then $X = 1\frac{1}{2} D + \frac{1}{8}"$
 $Y = \frac{1}{2} X$
 $Z = D$

Finished
 $1\frac{1}{2} D + \frac{1}{16}"$
 $D - \frac{1}{16}"$
 $D - \frac{1}{16}"$

STANDARD SIZES OF WELDED WROUGHT IRON PIPE

INSIDE DIAMETER, IN INCHES		Thickness in Inches	Weight per Foot in Lb.	Threads per Inch of Screw
* Nominal	Actual			
$\frac{1}{8}$	.270	.068	.24	27
$\frac{1}{4}$	.364	.088	.42	18
$\frac{3}{8}$	.494	.091	.56	18
$\frac{1}{2}$	.623	.109	.84	14
$\frac{3}{4}$	.824	.113	1.12	14
1	1.048	.134	1.67	11 $\frac{1}{2}$
1 $\frac{1}{4}$	1.380	.140	2.24	11 $\frac{1}{4}$
1 $\frac{1}{2}$	1.611	.145	2.68	11 $\frac{1}{2}$
2	2.067	.154	3.61	11 $\frac{1}{4}$
2 $\frac{1}{2}$	2.468	.204	5.74	8
3	3.067	.217	7.54	8
3 $\frac{1}{2}$	3.548	.226	9.00	8
4	4.026	.237	10.66	8
4 $\frac{1}{2}$	4.508	.246	12.49	8
5	5.045	.259	14.50	8
6	6.065	.280	18.76	8
7	7.023	.301	23.27	8
8	7.982	.322	28.18	8
9	9.001	.344	33.70	8
10	10.019	.366	40.00	8

* Standard iron pipe is known to the trade by its nominal inside diameter which differs from its actual diameter as shown in the table.

MISCELLANEOUS DATA

DATA ON SOLID COPPER WIRE—ROUND

Size B.&S. Gauge	Dia. Mills	Circ. Mills	Square Inch	Pounds per M. Ft.	Pounds per Mile	Breaking Strain Hard Drawn	Breaking Strain Soft Drawn	Ohms per Mile Soft Drawn 60° F.
0000	460	211600	.166190	640	3376	8370	5650	.259
000	410	168100	.131793	508	2677	6580	4480	.326
00	365	133225	.104520	402	2123	5226	3553	.412
0	325	105625	.082932	319	1684	4558	2818	.519
1	289	83521	.065733	353	1059	3743	2234	.656
2	258	66564	.052130	201	839	3127	1772	.824
3	229	52441	.041338	159	666	2480	1405	1.04
4	204	41616	.032784	126	528	1967	1114	1.312
5	182	33124	.025998	100	419	1559	883	1.656
6	162	26244	.020617	79	332	1237	700	2.09
7	144	20736	.016349	63	263	980	555	2.62
8	128	16384	.012966	50	209	778	400	3.35
9	114	12996	.010284	40	166	617	349	4.23
10	102	10404	.008153	31.3	137	489	277	5.27
11	91	8281	.006467	24.9	104	388	219	6.63
12	81	6561	.005128	19.7	82.6	307	174	8.37
13	72	5184	.004067	15.7	65.6	244	138	10.6
14	64	4096	.003225	12.4	51.9	193	109	13.4
15	57	3249	.002557	9.84	41.2	153	87	16.9
16	51	2601	.002028	7.81	32.7	133	69	21.1
17	45	2025	.001608	6.19	25.9	97	55	27.0
18	40	1600	.001275	4.91	20.5	77	43	34.2
19	36	1296	.001011	3.88	16.3	61	34	42.4
20	32	1024	.000802	3.09	12.9	48	27	53.7

DATA ON COPPER CABLE

Size B.&S. Gauge	No. of Wires in Strand	Dia. of Wires in In.	Dia. of Bare Cable in In.	Nearest to In.	Millimeter	Lbs. per 1000 Ft.	Lbs. per Mile
14 B.&S.	7	.0243	.0729	$\frac{3}{16}$ "	1.9843	13	68
12 B.&S.	7	.0306	.0918	$\frac{3}{16}$ "	2.3812	20	105
10 B.&S.	7	.0386	.1158	$\frac{1}{4}$ "	3.1749	32	168
8 B.&S.	7	.0485	.1455	$\frac{1}{4}$ "	3.5718	51	269
6 B.&S.	7	.0613	.1839	$\frac{1}{4}$ "	4.7624	81	427
5 B.&S.	7	.0688	.2064	$\frac{1}{4}$ "	5.1592	103	544
4 B.&S.	7	.0773	.2319	$\frac{1}{4}$ "	5.9530	129	682
3 B.&S.	7	.0868	.2604	$\frac{1}{4}$ "	6.7467	164	867
2 B.&S.	7	.0974	.2922	$\frac{1}{4}$ "	7.5404	206	1089
1 B.&S.	19	.0664	.3320	$\frac{1}{4}$ "	8.3342	259	1368
0 B.&S.	19	.0746	.3750	$\frac{1}{4}$ "	9.5248	328	1733
00 B.&S.	19	.0838	.4190	$\frac{1}{4}$ "	10.715	414	2192
000 B.&S.	19	.094	.4700	$\frac{1}{4}$ "	11.906	520	2745
0000 B.&S.	19	.1056	.5280	$\frac{1}{4}$ "	13.493	658	3484
250,000 C.M.	37	.0823	.5754	$\frac{1}{4}$ "	14.684	775	4080
300,000 C.M.	37	.0906	.6342	$\frac{1}{4}$ "	16.272	943	4984
350,000 C.M.	37	.0974	.6818	$\frac{1}{4}$ "	17.462	1087	5476
400,000 C.M.	37	.104	.7280	$\frac{1}{4}$ "	18.653	1242	6566
450,000 C.M.	37	.111	.7770	$\frac{1}{4}$ "	19.843	1415	7480
500,000 C.M.	61	.0906	.8154	$\frac{1}{4}$ "	20.637	1554	8222
550,000 C.M.	61	.095	.8550	$\frac{1}{4}$ "	21.828	1709	9032
600,000 C.M.	61	.0992	.8928	$\frac{1}{4}$ "	22.621	1864	9852
650,000 C.M.	61	.1033	.9297	$\frac{1}{4}$ "	23.415	2020	10688
700,000 C.M.	61	.1072	.9648	$\frac{1}{4}$ "	24.606	2177	11506
750,000 C.M.	61	.111	.9990	1	25.3995	2333	12304
800,000 C.M.	61	.1146	1.0314	$\frac{1}{4}$ "	26.590	2487	13136
900,000 C.M.	61	.1216	1.0944	$\frac{1}{4}$ "	27.781	2813	14864
1000,000 C.M.	61	.1281	1.1529	$\frac{1}{4}$ "	29.368	3110	16498
1250,000 C.M.	91	.1173	1.2903	$\frac{1}{4}$ "	32.940	3888	20534
1500,000 C.M.	91	.1284	1.4124	$\frac{1}{4}$ "	36.115	4660	24610
1750,000 C.M.	127	.1173	1.5262	$\frac{1}{4}$ "	38.893	5435	28700
2000,000 C.M.	127	.1255	1.6315	$\frac{1}{4}$ "	41.671	6212	32800

MISCELLANEOUS DATA
THERMOMETER SCALES
FAHRENHEIT COMPARED WITH *CENTIGRADE

Deg. Fah.	Deg. Cent.	Deg. Fah.	Deg. Cent.	Deg. Fah.	Deg. Cent.	Deg. Fah.	Deg. Cent.
212	100.0	145	62.8	78	25.6	11	-11.7
211	99.4	144	62.2	77	25.0	10	-12.2
210	98.9	143	61.7	76	24.4	9	-12.8
209	98.3	142	61.1	75	23.9	8	-13.3
208	97.8	141	60.6	74	23.3	7	-13.9
207	97.2	140	60.0	73	22.8	6	-14.4
206	96.7	139	59.4	72	22.2	5	-15.0
205	96.1	138	58.9	71	21.7	4	-15.6
204	95.6	137	58.3	70	21.1	3	-16.1
203	95.0	136	57.8	69	20.6	2	-16.7
202	94.4	135	57.2	68	20.0	1	-17.2
201	93.9	134	56.7	67	19.4	0	-17.8
200	93.3	133	56.1	66	18.9	-1	-18.3
199	92.8	132	55.6	65	18.3	-2	-18.9
198	92.2	131	55.0	64	17.8	-3	-19.4
197	91.7	130	54.4	63	17.2	-4	-20.0
196	91.1	129	53.9	62	16.7	-5	-20.6
195	90.6	128	53.3	61	16.1	-6	-21.1
194	90.0	127	52.8	60	15.6	-7	-21.7
193	89.4	126	52.2	59	15.0	-8	-22.2
192	88.9	125	51.7	58	14.4	-9	-22.8
191	88.3	124	51.1	57	13.9	-10	-23.3
190	87.8	123	50.6	56	13.3	-11	-23.9
189	87.2	122	50.0	55	12.8	-12	-24.4
188	86.7	121	49.4	54	12.2	-13	-25.0
187	86.1	120	48.9	53	11.7	-14	-25.6
186	85.6	119	48.3	52	11.1	-15	-26.1
185	85.0	118	47.8	51	10.6	-16	-26.7
184	84.4	117	47.2	50	10.0	-17	-27.2
183	83.9	116	46.7	49	9.4	-18	-27.8
182	83.3	115	46.1	48	8.9	-19	-28.3
181	82.8	114	45.6	47	8.3	-20	-28.9
180	82.2	113	45.0	46	7.8	-21	-29.4
179	81.7	112	44.4	45	7.2	-22	-30.0
178	81.1	111	43.9	44	6.7	-23	-30.6
177	80.6	110	43.3	43	6.1	-24	-31.1
176	80.0	109	42.8	42	5.6	-25	-31.7
175	79.4	108	42.2	41	5.0	-26	-32.2
174	78.9	107	41.7	40	4.4	-27	-32.8
173	78.3	106	41.1	39	3.9	-28	-33.3
172	77.8	105	40.6	38	3.3	-29	-33.9
171	77.2	104	40.0	37	2.8	-30	-34.4
170	76.7	103	39.4	36	2.2	-31	-35.0
169	76.1	102	38.9	35	1.7	-32	-35.6
168	75.6	101	38.3	34	1.1	-33	-36.1
167	75.0	100	37.8	33	0.6	-34	-36.7
166	74.4	99	37.2	32	0.0	-35	-37.2
165	73.9	98	36.7	31	-0.6	-36	-37.8
164	73.3	97	36.1	30	-1.1	-37	-38.3
163	72.8	96	35.6	29	-1.7	-38	-38.9
162	72.2	95	35.0	28	-2.2	-39	-39.4
161	71.7	94	34.4	27	-2.8	-40	-40.0
160	71.1	93	33.9	26	-3.3	-41	-40.6
159	70.6	92	33.3	25	-3.9	-42	-41.1
158	70.0	91	32.8	24	-4.4	-43	-41.7
157	69.4	90	32.2	23	-5.0	-44	-42.2
156	68.9	89	31.7	22	-5.6	-45	-42.8
155	68.3	88	31.1	21	-6.1	-46	-43.3
154	67.8	87	30.6	20	-6.7	-47	-43.9
153	67.2	86	30.0	19	-7.2	-48	-44.4
152	66.7	85	29.4	18	-7.8	-49	-45.0
151	66.1	84	28.9	17	-8.3	-50	-45.6
150	65.6	83	28.3	16	-8.9	-51	-46.1
149	65.0	82	27.8	15	-9.4	-52	-46.7
148	64.4	81	27.2	14	-10.0	-53	-47.2
147	63.9	80	26.7	13	-10.6	-54	-47.8
146	63.3	79	26.1	12	-11.1	-55	-48.3

* Centigrade readings to the nearest decimal.

MISCELLANEOUS DATA

CENTIGRADE COMPARED WITH FAHRENHEIT

Deg. Cent.	Deg. Fah.	Deg. Cent.	Deg. Fah.	Deg. Cent.	Deg. Fah.	Deg. Cent.	Deg. Fah.
100	212.0	62	143.6	24	75.2	-14	6.8
99	210.2	61	141.8	23	73.4	-15	5.0
98	208.4	60	140.0	22	71.6	-16	3.2
97	206.6	59	138.2	21	69.8	-17	1.4
96	204.8	58	136.4	20	68.0	-18	-0.4
95	203.0	57	134.6	19	66.2	-19	-2.2
94	201.2	56	132.8	18	64.4	-20	-4.0
93	199.4	55	131.0	17	62.6	-21	-5.8
92	197.6	54	129.2	16	60.8	-22	-7.6
91	195.8	53	127.4	15	59.0	-23	-9.4
90	194.0	52	125.6	14	57.2	-24	-11.2
89	192.2	51	123.8	13	55.4	-25	-13.0
88	190.4	50	122.0	12	53.6	-26	-14.8
87	188.6	49	120.2	11	51.8	-27	-16.6
86	186.8	48	118.4	10	50.0	-28	-18.4
85	185.0	47	116.6	9	48.2	-29	-20.2
84	183.2	46	114.8	8	46.4	-30	-22.0
83	181.4	45	113.0	7	44.6	-31	-23.8
82	179.6	44	111.2	6	42.8	-32	-25.6
81	177.8	43	109.4	5	41.0	-33	-27.4
80	176.0	42	107.6	4	39.2	-34	-29.2
79	174.2	41	105.8	3	37.4	-35	-31.0
78	172.4	40	104.0	2	35.6	-36	-32.8
77	170.6	39	102.2	1	33.8	-37	-34.6
76	168.8	38	100.4	0	32.0	-38	-36.4
75	167.0	37	98.6	-1	30.2	-39	-38.2
74	165.2	36	96.8	-2	28.4	-40	-40.0
73	163.4	35	95.0	-3	26.6	-41	-41.8
72	161.6	34	93.2	-4	24.8	-42	-43.6
71	159.8	33	91.4	-5	23.0	-43	-45.4
70	158.0	32	89.6	-6	21.2	-44	-47.2
69	156.2	31	87.8	-7	19.4	-45	-49.0
68	154.4	30	86.0	-8	17.6	-46	-50.8
67	152.6	29	84.2	-9	15.8	-47	-52.6
66	150.8	28	82.4	-10	14.0	-48	-54.4
65	149.0	27	80.6	-11	12.2	-49	-56.2
64	147.2	26	78.8	-12	10.4	-50	-58.0
63	145.4	25	77.0	-13	8.6		

HIGH TEMPERATURES JUDGED BY COLOR

(KENT)

The temperature of a body can be approximately judged by the experienced eye unaided, and M. Pouillet has constructed a table which has been generally accepted, giving the colors and their corresponding temperature as below:

Color	Deg. C.	Deg. F.	Color	Deg. C.	Deg. F.
Incipient red heat	525	977	Deep orange heat	1100	2021
Dull red heat	700	1292	Clear orange heat	1200	2192
Incipient cherry-red heat	800	1472	White heat	1300	2372
Cherry-red heat	900	1652	Bright white heat	1400	2552
Clear cherry-red heat	1000	1832	Dazzling white heat	1500	2732
				to	to
				1600	2912

MISCELLANEOUS DATA

TABLE OF SPECIFIC GRAVITIES AND WEIGHTS

(TRAUTWINE)

The specific gravity of any substance equals its weight in grams per cubic centimetre.

Substance	Average Sp. Gr.	Average Wt of Cu. Ft. Lb.
Aluminum	2.6	162
Antimony, cast, 6.66 to 6.74	6.70	418
Brass (copper and zinc), cast, 7.8 to 8.4	8.1	504
Brass, rolled	8.4	524
Bronze, copper 8 parts; tin 1. (gun metal) 8.4 to 8.6	8.5	529
Cement, hydraulic, American, Rosendale; ground, loose	average	56
Wide variations in weight of hydraulic cements, often occur owing to want of uniformity in the composition of stone, process of manufacture and difficulty of measurement.		
Copper, cast, 8.6 to 8.8	8.7	542
Copper, rolled, 8.8 to 9.0	8.9	555
Granite, 2.56 to 2.88	2.72	170
Gneiss, Hornblendic, quarried, in loose piles	average	100
Greenstone, trap, quarried, in loose piles	average	107
Gravel, about the same as sand, which see		
Iron, cast, 6.9 to 7.4	7.15	446
Iron, cast, usually assumed at	7.21	450
At 450 lbs. a cubic inch weighs .2604 lbs.; 8601.6 cubic inches a ton; and a lb. = 3.8400 cubic inches; cast-iron GUN METAL		
Iron, wrought, 7.6 to 7.9; the purest has the greatest sp. gr.	7.48	467
Iron, large rolled bars, usually assumed at	7.77	485
Iron, sheet	7.69	480
At 480 lbs. a cubic inch weighs .2778 lbs.; and a lb. = 3.600 cubic inches		
Light iron indicates impurity.		
Lead, of commerce, 11.30 to 11.47 either rolled or cast	11.38	709.6
Limestones and Marbles, quarried in irregular fragments, one cubic yard solid, makes about 1.9 cubic yards perfectly loose; or about 1½ yards piled. In this last case, .571 of the pile is solid; and the remaining .429 part of it is voids: average, piled		
Mica, 2.75 to 3.1	2.93	96
Platinum, 21 to 22	21.5	183
Quartz, quarried, loose, one measure solid makes full 1½ broken and piled		1342
Rosin	1.1	94
Sand, of pure quartz; perfectly dried, and loose, usually 112 to 133 lbs. per struck bushel		68.6
Sandstones, quarried and piled, one measure solid makes about 1½ piled		90 to 106
Shales, quarried, in piles		86
Steel, 7.7 to 7.9; the heaviest contains least carbon	7.85	92
Steel is not heavier than the iron from which it is made; unless the iron had impurities which were expelled during its conversion into steel.		
Sulphur	2.0	125
Tin, cast, 7.2 to 7.5	7.35	459
Trap, quarried, in piles	average	107
Water, pure rain, or distilled at 62° Fah. Barom. 30 ins.	1.0	62.355
Although the weight of fresh water is generally assumed as sixty-two and one-third lbs. per cu. ft., yet 62½ would be nearer the truth, at ordinary temperatures of about 70°; or a lb. = 27.759 cu. ins.; and a cu. in. = .5764 oz. avoirdupois; or .5254 oz. troy; or 252.175 grains. The grain is the same in troy, avoirdupois and apothecary.		
Zinc or spelter, 6.8 to 7.2	7.00	437.5

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